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WAGE DIFFERENTIALS IN A LARGE STEEL FIRM

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The present article is the first of a projected series on wages in a single steel firm: the Appleby-Frodingham Steel Company (a branch of the United Steel Companies). No firm could possibly have been more helpful, and we owe them the very greatest debt. Not only were all the available records carefully explained and put unreservedly at our disposal, but the firm undertook the tedious and time-consuming task of drawing the sample on which the study is based and of sending the relevant documents through the post with the utmost punctuality as these were required. Moreover, the firm provided detailed notes on the payment systems of a very large number of individual workers, and participated in a lengthy correspondence on the infinitude of small points which were constantly arising. No research workers, in fact, could have been assisted more generously and informatively at every stage of the enquiry.

We would like, in particular, to thank the present Labour Manager, Mr. L. Peirson. We should also like to thank Mr. F. C. Davis, his predecessor in the post, and Mr. E. G. Hopkinson, the head of the wages record office. It only remains to emphasise that neither the firm nor the individuals mentioned are in any way responsible for the use made of the material which they so unstintingly provided.

I. Introduction

Current views on the development of wage structures

In recent years, occupational differences in wages—particularly those said to be related to skill—have figured increasingly in collective bargaining. A good deal of empirical research has, moreover, been concerned with measuring these and other wage differences in various ways, examining their development over time, and attempting to interpret or to rationalise them. So long as little was known about wages, it seemed safe to assume that they, like other kinds of price, would prove to be determined by the pressures of the market. Any observed irregularities in wage patterns could be explained in footnotes as being due to ' frictions ', ' rigidities ', or ' imperfections.' However, as more information became available on how wage rates were fixed and what relation these bore to actual earnings, the apparent chaos provoked something of a *volte-face* in interpretation. The frictions and rigidities began to assume more importance than the market mechanism itself, and many non-economic or ' political ' determinants of wages were suggested—the internal tensions of institutions deriving from the necessity to survive or to expand, ethical judgments based on need or equity, considerations of social prestige and so on. On the whole, however, the extreme ' economic ' and ' institutional ' positions are being abandoned; and it is usually admitted that, since market forces operate in a complex social and institutional framework, the pattern of wages is distorted out of its ' natural ' shape to a greater or less extent at different times.[1]

This may be no more than an uneasy compromise; but the controversy has contributed something to the understanding of relative wages. Thus

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[1] Lloyd Reynolds, however, in a thoughtful and comprehensive study of wages structures in several countries, concludes that ' in most cases bargained wage changes do not depart far from what was " in the cards " on economic grounds.' (*The Evolution of Wage Structure*, 1956, p. 373).

H. A. Turner,[1] in seeking to account for the narrowing since 1939 of ' skill differentials ' in the wage rates agreed nationally by many British industries (and their maintenance by a few others, notably iron and steel), has emphasised the importance of trade union development in two of its aspects—' the forms of organisation and the systems of labour recruitment it supports '. He instances, in addition the hardiness and persistence of ' minor ' differentials (not only between workers of comparable skills but also between workers in different regions and sections of industry). Originally, these differences may well have been largely due to market pressures; but they were frozen in the development of centralised negotiation, and many of them are still being rationalised on more or less implausible grounds. If one passes from the pattern of wage rates to that of actual earnings, in many industries the anomalies multiply. Thus in engineering—that is, in much of manufacturing—there is a very great variability in earnings, not only between occupations, but within single occupations from one firm to another.[2] Some variability could obviously be expected, if only because any large occupational category is bound to include workers possessing different degrees of skill and exerting different amounts of effort. But in so far as differences in skill and effort are not enough to account for the existing variability, further explanation is required. Thus Professor Hicks suggests that much of the gap between wage rates and actual earnings (rates being fixed nationally while the level of earnings is determined by local and domestic bargaining), may be due to the pull of the labour market, and on the whole approves: ' the economist could look with some satisfaction upon an arrangement by which basic agreed rates are kept in relation with the differentials that are appropriate in the long period, while short-period scarcities are reflected in (no doubt relatively disorderly) bonuses above the agreed minima.'[3] In the same vein, Roberts comments: ' this bifocal wage policy gives employers a convenient degree of flexibility, since they can adjust their actual wage payments to the level demanded by a competitive market situation.'[4]

This view is attractive but vulnerable. Thus 'flexibility' is, in principle, excellent; but it must be purchased at the price of equity. Moreover, earnings are extensively adjustable upwards, but hardly at all downwards: can a ratchet really be termed ' flexible '? Again, differentials are undoubtedly established for long periods; but in what sense are they ' appropriate'? Is it only 'short-period scarcities' which are reflected in the rates-earnings gap? Are wage payments adjusted with any precision to ' the level demanded by a competitive situation'? There is clearly a risk of begging the very questions one should be answering. Undoubtedly, *some* of the differences between firms in occupational earnings may colourably be attributed to differences in labour supply and demand, and *some* of the differences to the heterogeneity of particular occupations in respect of skill and effort; but, when all this has been said, the actual variability found in practice appears too great for all of it to be explained in these ways.

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[1] 'Trade Unions, Differentials and the Levelling of Wages,' *Manchester School*, September 1952, pp. 227–282.

[2] See ' The Variability of Engineering Earnings,' BULLETIN, May 1956.

[3] J. R. Hicks, ' Economic Foundations of Wage Policy,' *Economic Journal*, September 1955, p. 404.

[4] B. C. Roberts, ' Employer and Industrial Relations in Britain and America,' *Political Quarterly*, July–September 1956, p. 334 .

The same arguments apply to the great variation observed between firms in the relative wages of skilled and unskilled workers. Thus the wide differences between one firm and another in the relative hourly earnings of engineering fitters and labourers appear too great to be explained by differences in relative skill and effort, or to be rationalised on the score of differences in the relative supply of different kinds of labour. There are in practice factors not systematically related to skill and effort on the one hand, or to labour supply on the other (such as the accepted organisation of work or even the traditional systems of payment) which have a strong effect on workers' paypackets. As we shall see, it is not only in engineering that the established practices of particular firms influence the levels of their employees' earnings.

In this study we are proposing to examine wage differences between and within different categories of workers in a single steelmaking firm. Thus many of the features of previous studies—systematic wage differences between districts, sections of industry, and particular types of firm—will obviously be absent in this microcosm; and we can show in detail how relative levels of earnings are determined, not only by differences in wage rates, but also by differences in organisation of work, length of working week, and systems of payment. Moreover, the steel industry employs two distinct types of labour—doing different work, having different ranges of skill, and maintaining different bargaining traditions.

Wage differentials and the concept of skill

In British industry, differences in skill are still taken as the main justification for differences in workers' wages. In virtually all firms the primary classification of occupations is by skill, since wage structures are traditionally based on skill distinctions. Thus the term ' skill differential ' is commonly used to describe the money difference or percentage difference in the wages of workers in different skill categories, the—quite false—implication being that skill alone accounts for the differences in question. The only component of wages related, in intention at least, to skill is the time rate. But in practice there is usually no pretence of fixing time rates systematically or ' scientifically '; they are determined by bargaining pressure, tradition, or rule of thumb.

Part of the difficulty lies in the concept of skill itself. Strictly speaking, skill should mean an ability *acquired* by specific training, as contrasted with *inherent* ability or talent. Classical wage theory distinguishes also the nature of the reward to each. But in practice these distinctions cannot really be maintained, and the ' skill ' rewarded is at best an amalgam of trained and native talent. Moreover, even in some industries with an apprenticeship tradition, training is less rigorous than it was; and the growth of the ' semi-skilled ' in many trades has proliferated occupations which are difficult to classify in terms of skill alone. Again, seniority, which may originally have been a crude measure of length of training, has in some cases emerged as an independent criterion for classifying men within skill groups. Finally, in many firms there is a good deal of false reasoning involved in classifying workers by skill: all skilled men are paid high wages, therefore all those paid high wages are skilled.

But even if skill could be rigorously defined and every worker accurately graded, the complexity of modern industrial processes is such that the administrative need for retaining a two- or three-fold skill classification (appropriate enough to more primitive methods of production) itself introduces complications. As each broad category will comprise workers of very different degrees of skill, the range of skills within each category may well include differences almost as great as that between the average levels of skill of the different categories. In practice, of course, the grading of workers by skill can rarely be defended as accurate. In any case skill is only one of the recognised elements of doing a job; other elements—responsibility for men or materials, intensity of physical or mental effort, hazards or other unpleasantness—are also eligible for reward. Some of these elements may on occasion be rewarded by specific payments above the wage rate, or they may be taken into account—though perhaps not explicitly—when the level of the rate itself is fixed. Practice in these respects may differ even within a single department of a single firm; thus a straight comparison of the wages of workers in different skill categories may tell one little about even the imputed relative skills of these workers. That overall differences in workers' wages, regardless of their composition, should continue to be loosely referred to as ' skill differentials ' results from a persistence in classifying jobs only by skill; and it implies an essential tidiness and rationality which is belied by the haphazard development of many wage structures.

These are not simply theoretical talking points. Thus the year after the data used in this article were collected, the firm reshuffled its workers within the threefold skill grading which it employs,[1] with the result that the proportion of workers classified as semi-skilled rose from 31 to 41 per cent, while the unskilled fell correspondingly from 48 to 37. In some departments workers were reshuffled wholesale; in one of them, the downgrading of ' skilled ' loco drivers and the upgrading of ' unskilled ' shunters raised the proportion of ' semi-skilled ' workers from 16 to 76 per cent. That it was possible to make such substantial changes by the stroke of a pen sufficiently illustrates the absence of any objective skill criterion which is universally applicable in practice.

The measurement of differentials

The commonest concept of a wage differential is that of a money or percentage difference in time rates of wages. This concept of relative wages has the merit of being based on that part of the worker's pay which is controlled through national bargaining. A time rate is the basis of most workers' wages and provides at least a floor for their earnings: moreover, there may well be some connection between the level of a worker's rate and his status in society[1]—especially since the only public knowledge of the relative remuneration of particular occupations is based on rates of wages.

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[1] The point of the reclassification was to achieve a uniform practice over all the United Steel companies.

But the usefulness of relationships based on wage rates is limited because (1) rates are nationally agreed for comparatively few ' key ' occupations; (2) although there are often many intermediate rates agreed within particular districts and firms, a multiplicity of rates poses problems of averaging for which the necessary weights may not be available; (3) wage rates may be standard or minimum rates—*i.e.* they may differ very much in their relation to what workers are actually paid; (4) in any case these rates have a dubious applicability to workers paid wholly or partly by results; and although this need not matter very much if all the workers considered are paid by the same system, it will invalidate comparisons between groups of workers on different systems of payment.

Some of these purely practical disadvantages are avoided if relative earnings are examined instead of relative rates; for earnings alone provide a basis for comparing the remuneration of workers paid by different systems. It is not so much that earnings relationships are in an absolute sense ' better ' or ' more realistic ' indicators of differentials as that they illustrate different aspects of relative wages. Thus if we compare weekly earnings we are taking into account all the items of working life—including long hours—which attract payment, while a comparison of hourly earnings excludes the effect of variations in the *length* of the working week.[2] But there is a special problem in comparing the earnings of different groups of workers. Whereas a single wage rate is common to a large number of workers, the actual earnings of these workers will often vary very widely, and the earnings of any one category will overlap extensively with those of others. Owing to the overlapping, and to the many possible differences in the shapes of the distributions, relationships based on averages are apt to be very misleading—if it is assumed that they are necessarily typical. This will be illustrated by our analysis of actual distributions in this article.

II. WAGE RELATIONSHIPS IN THE FIRM

Processes, departmental organisation, and skill classification

The Appleby-Frodingham Steel Company is a large integrated iron and steel works. It has four main production departments: coke is made in the coke ovens,[3] iron in the blast furnaces, steel ingots in the melting shops, and finished products in the rolling mills. The blast furnaces use low-grade home ores, mined by one of the firm's associates. The bulk of the iron, when made, passes directly to the melting shops in its molten state—the balance being cast into pigs for use by associated companies. In the melting shops, the molten iron is charged into mixer furnaces, in order to average and improve its quality. It is then transferred to basic open-hearth tilting furnaces. These have a capacity of 250 to 300 tons, and a normal furnace charge consists of three-quarters mixer metal and one-quarter internal steel scrap—mainly from the rolling mills. When the tilting furnaces are tapped, the molten metal is run into large 85- to 100-ton ladles. It is then 'teemed' into hematite ingot moulds of various sizes and shapes, for transfer to the rolling mills. The larger of these, the plate mills, produces a variety of plates mainly for use in the shipbuilding industry; the smaller, the section mills, produces a very wide variety of beams, angles, flats and other sections, the bulk of which are used in building and constructional engineering. One of the customers of both mills is an associated constructional engineering company on the site—which, since it plays an important part in the firm's internal structural maintenance, we are treating as a department of the firm.

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[1] See Barbara Wootton, *The Social Foundations of Wage Policy*, 1955, p. 68 ff.

[2] However, the (usually unavoidable) convention of obtaining hourly earnings by a division of hours worked into weekly earnings fails to remove overtime and shift premia—*i.e.* the figures are still affected by the *timing* of people's work over the 24 hours (and even, to a certain extent, by the length of the working week).

[3] The coke ovens, in which 140 workers were employed in 1951, are excluded from consideration in this article. At this time the department was expanding so fast that a large number of workers who began the year as unskilled finished as semi-skilled.

Nearly all the remaining departments, comprising half the labour force, are ancillary. Maintenance workers such as fitters and bricklayers, to whichever department they may in fact be attached, are included for the firm's purposes in a separate maintenance department. In the same way the traffic department includes all workers concerned with transport; and the steam and power department is similarly responsible for providing gas (both coke-oven and blast-furnace), steam, compressed air, etc., to all parts of the works. The other two large departments are the central engineering workshops, responsible for a variety of maintenance jobs (such as rebuilding locos) which are beyond the scope of the maintenance department, and the general services department, which includes workers as various as boiler-coverers, mess-room attendants, glaziers, lorry drivers, window cleaners, and fire-fighters. The remaining departments are small: the tarmac[1] and basic slag department (a by-product plant), the pit arch department (a specialised department producing steel arches for collieries), the roll turners (responsible for the rollers used in the mills), the pattern shop and foundries (serving mainly the central engineering workshops), and a very small testing department. In 1951, when our data were collected, the firm employed rather over seven thousand adult male workers—of whom 470 were drawn in a random sample[2] stratified by skill and department. Table I shows the grading and disposition of this labour force, before and after the reclassification which has been mentioned. Not only does the table illustrate the scale of this reclassification, but it will be seen that there are large differences between departments in the distribution of skill grades—the proportion of skilled men in the departments concerned with steelmaking processes proper (which head the list) being markedly lower than in the constructional engineering, maintenance, and other departments. The significance of this will shortly be examined.

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[1] Tarmac production has since been hived off to an associated company.

[2] A description of the sample is given in the Appendix.

TABLE I

Relative Numbers Employed in Different Grades of Skill
April 1951 (A) and April 1952 (B)

Department		*Skilled*		*Semi-skilled*		*Unskilled*	
		no.	per cent	no.	per cent	no.	per cent
Blast furnaces* ...	(A)	29	*3.5*	230	*27.7*	570	*68.8*
	(B)	28	*3.5*	246	*31.1*	517	*55.4*
Melting shops	(A)	50	*10.1*	188	*38.1*	256	*51.8*
	(B)	88	*17.8*	198	*40.0*	209	*42.2*
Section mills	(A)	18	*3.8*	231	*48.8*	227	*47.4*
	(B)	35	*7.7*	239	*52.5*	181	*39.8*
Plate mills ...	(A)	24	*3.6*	358	*54.5*	275	*41.9*
	(B)	33	*5.1*	367	*56.5*	249	*38.4*
Traffic	(A)	123	*24.5*	79	*15.8*	299	*59.7*
	(B)	1	*0.2*	384	*76.0*	120	*23.8*
Constructional engineering	(A)	85	*22.7*	158	*42.1*	132	*35.2*
	(B)	91	*23.4*	197	*50.6*	101	*26.0*
Constructional engineering (maintenance) ...	(A)	95	*48.0*	43	*21.7*	60	*30.3*
	(B)	91	*47.0*	45	*23.0*	58	*30.0*
Maintenance	(A)	753	*35.9*	359	*17.1*	988	*47.0*
	(B)	819	*39.1*	613	*29.3*	661	*31.6*
Central engineering workshops	(A)	232	*44.0*	166	*31.5*	129	*24.5*
	(B)	244	*44.4*	212	*38.6*	93	*17.0*
Miscellaneous...† ...	(A)	88	*10.1*	351	*40.3*	431	*49.6*
	(B)	113	*13.8*	357	*43.5*	350	*42.7*
All above departments‡	(A)	1,497	*20.9*	1,163	*31.2*	3,367	*47.9*
	(B)	1,543	*21.7*	2,858	*41.0*	2,539	*37.3*

* Including pig caster department.

† Including: roll turners, pit arch plant, pattern shop & foundries, tarmac & basic slag, testing, steam & power, and general services.

‡ *I.e.*, all departments except the coke ovens (see p. 222 n. 3).

Relative wages in the firm as a whole

The figures used in this study refer to the income-tax year 1950–1, and since then there have been large changes in wages. We have therefore examined a few comparative figures for 1956–7. Naturally, the main change has been a large rise in the general level of wages; but there have also been some changes in relative wages, to which reference will be made where appropriate. By and large, however, the general picture of differentials has not altered much.

For a large number of those working in the firm, nationally-agreed time rates of wages either do not exist or, if they do, are difficult to identify or to compare with each other. Any attempt to examine wage differentials between skilled and unskilled workers over the firm as a whole must therefore be based on actual earnings. In most earnings enquiries—for example, those undertaken bi-annually by the Ministry of Labour or those carried out periodically by employers' associations for their own purposes—the figures are based on a single specimen week. But, while this practice is reasonable enough for a whole industry, it is obviously less satisfactory for a unit as small as a single firm. Thus, in order to avoid as far as possible the distortions which might arise from the adoption of a single specimen week which was unrepresentative or abnormal for particular groups of workers, it was decided to calculate, for each worker, the average of his gross earnings in ' normal '[1] weeks throughout the year. The distributions of these averages are given for each grade of skill in Diagram I and summarised in Table II. The marked differences in the shape of the distributions at once raise a familiar dilemma when one attempts to summarise the relationship between them by presenting a ' skill differential '. On the one hand, the selection of any one pair of summary measures in preference to another is largely arbitrary: there is no particular reason apart from convention to prefer means to modes, or to medians (or for that matter to any other order statistics); on the other, each of them results in a different ' skill differential '. Thus the differential based on the means of skilled and unskilled earnings is 22 per cent, whereas on the medians it is 17 per cent and on the modes 10 per cent; while for skilled and semi-skilled earnings the corresponding figures are 10, 8, and 3 respectively. But the range of earnings within each distribution, and the extensive overlap between distributions, raises real doubts of the the usefulness of any of these ' differentials ' as measures of relative earnings.

TABLE II

Relative Earnings of Skill Grades in the Firm as a whole*

Grade	*Mean*	*Median*	*Mode†*
Skilled	217/–	209/–	202/6
Semi-skilled	195/–	192/–	197/6
Unskilled	169/–	173/–	182/6
As prrcentage of skilled:			
semi-skilled	*90*	*92*	*97*
unskilled	*78*	*83*	*90*

* In this and future tables, unless it is otherwise stated, ' earnings ' means *average normal weekly earnings* as defined in the text, for the income-tax year 1950–51.

† With this kind of material the identification of the mode is necessarily arbitrary. These figures refer to the principal mode as determined on histograms of the earnings distributions *by 5/– intervals*. But all three distributions have, in fact, secondary modes not far short of these principal modes, and in each case these secondary modes lie on the other side of the medians! This explains the apparent inconsistency between the modes shown in this table and those that would be deduced from Diagram I.

As regards the extreme ranges of earnings, these were £23 for the skilled, £11 for the semi-skilled, and £8 for the unskilled. In effect, the highest-paid skilled man was earning about four times as much as the lowest-paid, and the highest-paid semi-skilled man and unskilled man about three times as much as the lowest-paid within their respective categories. These wide

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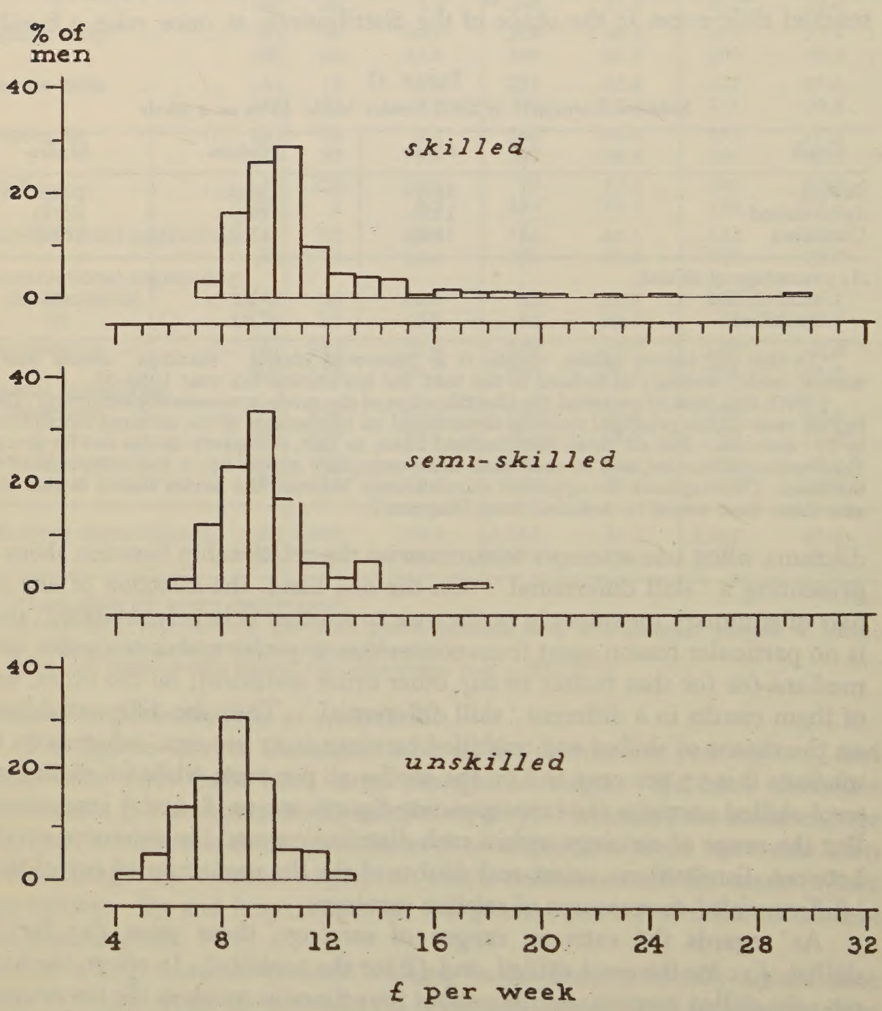
[1] ' Normal ' weeks exclude only (i) weeks during which the worker took his annual vacation; (ii) weeks in which the statutory holidays fell; (iii) weeks affected by sickness. (Since it was not possible to distinguish reliably between absence through sickness and absence from other causes, the convention adopted was to treat any absence of more than three successive days as due to sickness.)

Diagram I

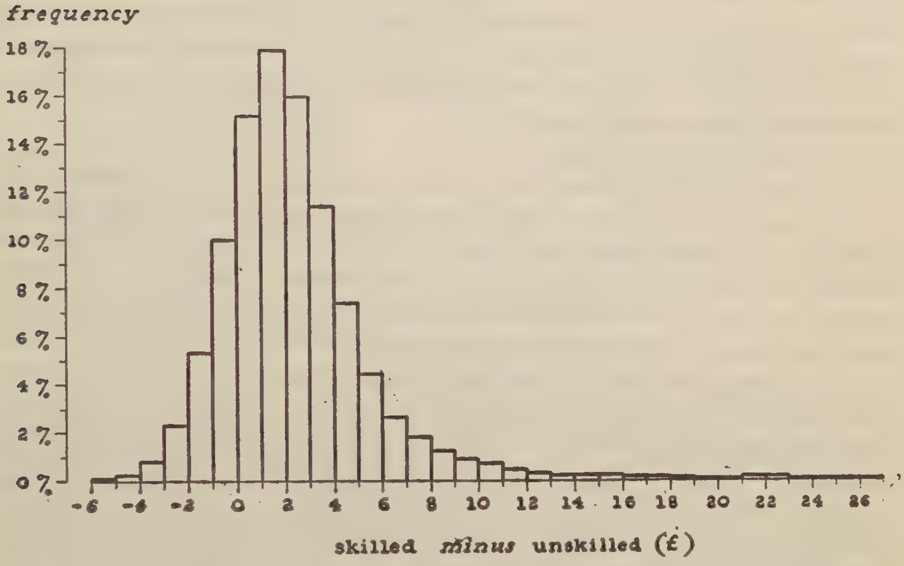
Distribution of Average Normal Weekly Earnings by Skill: Whole Firm



differences in earnings within skills are greater than the average differences between skills, however measured. The extent of overlap can be judged from the fact that, while almost 45 per cent of the skilled earned £9 a week or *less*, 63 per cent of the semi-skilled (and 30 per cent even of the unskilled) earned £9 or *more*. Thus almost half the skilled workers were earning the

Diagram II

Frequency Distribution of Differences in Earnings between Skilled & Unskilled Workers: Whole Firm



same as or less than a great many of the semi-skilled and a substantial proportion of the unskilled. In these circumstances any measure of the differential based on ' averages ', while not erroneous, is misleading since it describes a whole universe of differentials between pairs of workers in terms of one or other special case. While any average summarises a number of single observations, a relationship between averages is a summary of all possible combinations from two separate sets of observations; and the usual objections to the use of averages are obviously multiplied. Following our practice in an earlier article,[1] one may describe this ' universe ' of differentials by analysing the frequency distribution of the differences in earnings between all possible pairs of skilled and semi-skilled or unskilled workers. A mere glance at the earnings distribution tells us that the skilled-unskilled differential will be inverted in many of these cases: a frequency analysis reveals that if one selects pairs of workers at random, the differential is obliterated or inverted in one-third of the cases—in other words, the chances of an unskilled worker earning the same as or more than a skilled worker are about one in three. Diagram II shows the histogram of a frequency distribution of differences in the earnings of skilled and unskilled workers, and from it one can read off the percentage probability of skilled workers earning specific amounts more or less than unskilled. It will be seen that the most common difference in earnings (mode) is between £1 and £2, and that this is also the difference which would be earned in half the cases selected at random (median). The range and overlap of the original distributions, which give rise to so large a universe of differentials, are due both to the heterogeneity of the skill categories and to the influence on earnings of factors other than skill. There are in fact two distinct kinds of worker employed by the firm; and as the differences in the definition of skill and in other factors influencing earnings are demonstrably greater between these groups than within them, we shall henceforward treat each group separately.

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[1] 'On the Difficulties of Measuring Wage Differentials,' BULLETIN, November–December 1954.

The ' Production ' and ' Craft ' sectors

For administrative convenience, the firm classifies its workers according as they belong to production departments or to maintenance departments. However, this classification is of little value for an earnings study, if only because its frontiers do not correspond with those of the major collective agreements which cover workers in related groups of occupations and lay down the broad conditions under which these workers are to be paid. There are three important sets of such agreements: those concluded with the National Union of Blastfurnacemen, those with the Iron and Steel Trades Confederation, and those with a group of craftsmen's unions including the Amalgamated Engineering Union, the Electrical Trades Union, the Amalgamated Society of Woodworkers, and many others. In addition, certain smaller groups—*e.g.* bricklayers, platelayers, and slag workers (in the tarmac department)[1] have separate agreements. All agreements except those of the slag workers have cost-of-living clauses under which wage rates are adjusted automatically on a flat-rate basis; otherwise the agreed systems of payment for craftsmen tend to follow those of the engineering, building, and other industries. As a result, the extra pay for Sunday work, shiftworking, etc., are very different for these ' craft ' workers; and for this reason alone it is desirable to distinguish the two. We therefore propose to group the departments as follows:[2]

Production	*Craft*
Blast furnaces	Constructional engineering
Melting shops	Constructional department (maintenance)
Section mills	Maintenance
Plate mills	Central engineering workshops
Traffic	Miscellaneous Craft[3]

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[1] The small number of workers in the tarmac department—none of whom were classified as skilled—did not work under steel working conditions: *i.e.* their wages did not include the stabilised sliding-scale or cost-of-living additions. For this reason (as well as because the department has since been made independent of the firm proper) we have removed these workers from the scope of the present enquiry.

[2] A group of departments (testing, general services, and steam and power) are excluded mainly on the grounds that they include workers paid on both ' production ' and ' craft ' principles. In the remainder of this article, ' whole firm ' means all the remaining departments except the coke ovens (see p. 222, n. 3) and the tarmac department.

[3] Including: roll turners, pit arch plant, and pattern shop & foundries.

The distinction between Production and Craft sectors is important for another reason: skill has an entirely different meaning in the two sectors. In the Production sector, skill is acquired on the job. Workers are taken on as unskilled labourers (or as boys for the lighter jobs in the mills) and become skilled workers after working their way up promotion ladders. Each department contains many promotion ladders (for example, there are at least twenty in the plate mills) and these ladders differ greatly in length. Two specimens from the melting shops are shown:

Melters

Bye-turn melter (selected from carefully chosen labourers with appropriate qualifications)

3rd hand, new mixer furnace
3rd hand, old mixer furnace

2nd hand, new mixer furnace
2nd hand, old mixer

3rd-hand melter, junior[1] furnace
3rd-hand melter, senior furnace

2nd-hand melter, junior furnace
2nd-hand melter, senior furnace

1st-hand melter, junior furnace
1st-hand melter, senior furnace.

Pitmen

4th hand, new mixer furnace
4th hand, old mixer furnace

new stripper attendant
old stripper attendant

assistant teemer.

Ordinary labourers are not on promotion ladders, and probably the most important step for any worker is the first—that on to a definite ladder. For once he is on a ladder the rest of his career is predetermined. He cannot change ladders without starting again,[2] and his rate of promotion (unless he is manifestly unfit) depends solely on the rate at which those senior to him retire or leave. The arrangements by which workers get on to specific ladders vary in detail from one department to another, and there is some limited flexibility at this stage. ‘ Skill ’ is conferred simply by seniority on the job: the skilled workers are the top men on each ladder, the semi-skilled are the middle men, and the unskilled include both the bottom men on ladders and the labourers who have not yet made the first step. Some of the top jobs, such as that of a first-hand melter, are really highly skilled while others, such as that of a loco driver, are not. Skill therefore has no precise meaning in this sector.

There is a further complication. Since steel works operate continuously, all production jobs have to be filled. But workers have to have holidays, and they sometimes fall sick or go absent for other reasons; and it is therefore essential to fill the places of those who are missing. In the case of long-term absences, this is done by moving everybody up the ladder one place and bringing in a ‘ bye-turn labourer ’ to fill the bottom place; but for short absences, the large re-shuffling of jobs involved is avoided by simpler (but still automatic) stop-gap arrangements. In effect, therefore, many labourers are really part of a reserve labour force and get frequent chances to work at rather better-paid jobs, and sometimes at semi-skilled jobs. Similarly, the unskilled already on promotion ladders have to be ready to do semi-skilled jobs, and the semi-skilled to do skilled jobs. This is yet another reason why the concept of skill is apt to be blurred.

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[1] The number of steps for each grade of melter depends on the number of furnaces in the particular melting shop.

[2] Only the manning of entirely new (not merely extended) plant is at the discretion of management.

This whole concept of skill-by-seniority is, in fact, radically different from the traditional one. Skill in Production departments is, with few exceptions, specific to a particular steelmaking process; but on the Craft side what is required is the typical skill of fitters, or of bricklayers, or of electricians, or of other apprentice-trained craftsmen. This apprenticeship requirement[1] means that there is a sharp distinction between skilled men and the rest. The distinction between semi-skilled and unskilled is much less sharp, and most Craft workers in the former grade (as in Production) have been promoted from the ranks of the unskilled.

It is therefore not at all surprising that there should be very strong contrasts between Production and Craft in the proportions of skilled (Table III), in their ages, and above all in the lengths of time they have been in the firm's service. Only 2 per cent of skilled Production workers were under 35 years old, as against nearly 40 per cent of skilled Craft workers—the average ages of skilled workers in the two sectors being 48 and 37 respectively. No Production worker who had been with the firm for less than 14 years was classified as skilled, whereas over 70 per cent of the skilled Craft workers in the sample had been with the firm no longer than this. The average lengths of service of skilled workers in the two sectors were 25 and 11 years respectively.

TABLE III

Relative Numbers of Workers in Skill Grades

Sector and grade	*Numbers employed*	*Per cent*
Production:		
Skilled	244	*8*
Semi-skilled	1,086	*37*
Unskilled	1,627	*55*
Total	2,957	*100*
Craft:		
Skilled	1,246	*35*
Semi-skilled	800	*23*
Unskilled	1,463	*42*
Total	2,509	*100*

Relative wages in the two sectors

Some of the above differences between the Production and Craft sectors are naturally reflected in workers' wages. In Diagram III, the earnings of skilled and unskilled workers shown for the firm as a whole in Diagram I are broken down by sector. The very much wider range of skilled earnings in Production (£22) than in Craft (£9) can be attributed in general to the

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[1] Dilution in wartime was fairly common; it can occur even in peacetime—though only with the consent of the branch of the union concerned.

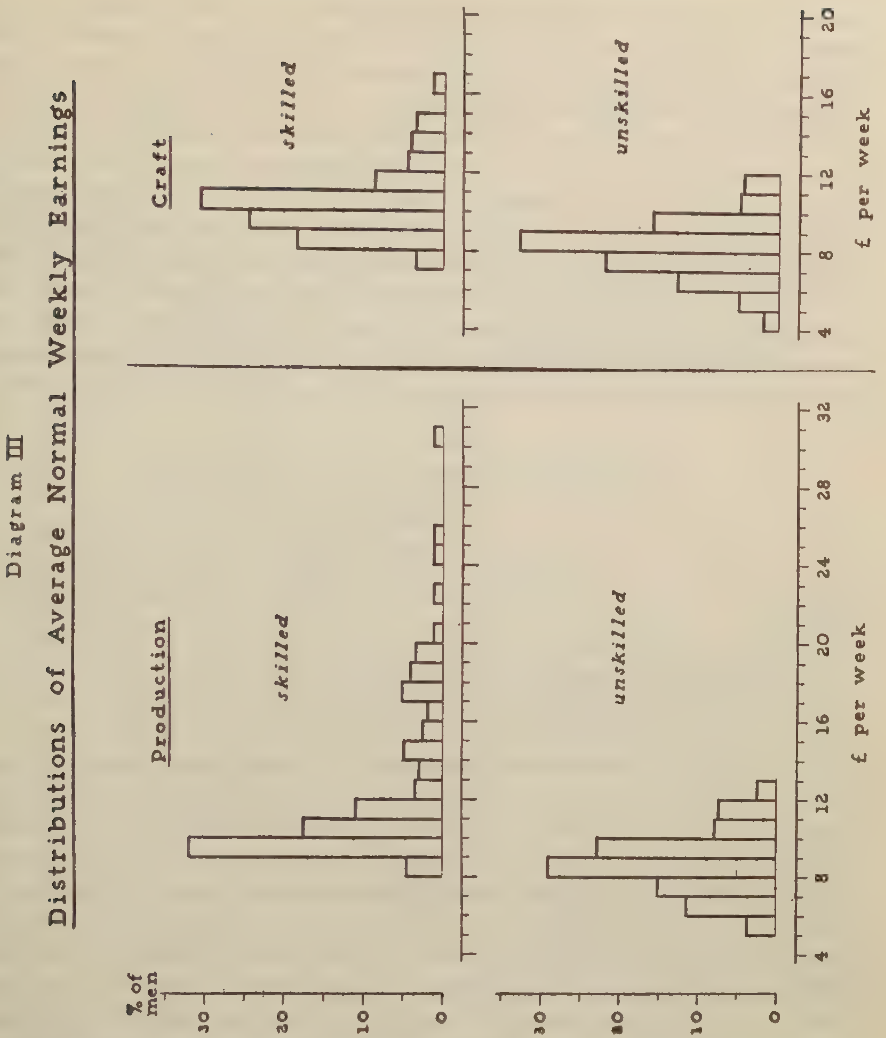

Diagram III

Distributions of Average Normal Weekly Earnings

heterogeneity of the skilled group in the former. The tail of the distribution for skilled Production workers is in fact mainly accounted for by small groups of workers in the mills and the melting shops. Steel melters are paid very largely by tonnage; and, although payment so largely by tonnage is not by any means the general rule, tonnage payments—related wherever possible to the output of small groups—form, on the whole, a bigger proportion of total earnings in Production than they do in Craft. For most Craft workers, tonnage payments take the form of bonuses—*i.e.* proportionately small additions to rates; moreover, they are usually calculated on the output of the whole works, so that similar grades of men receive identical bonuses irrespective of where they work. For unskilled workers, the ranges of earnings in the two sectors were virtually identical (almost £7). The unskilled are, of course, a less highly differentiated group than the skilled in each sector; moreover, payment by results is less widespread among them. Both distributions are more or less normal in shape.

The differences between the Production and Craft sectors in the shape of the distributions of skilled and unskilled earnings not only illustrate the problems of measurement already mentioned, but raise further difficulties when comparison is attempted. In Production, the two distributions are dissimilar in shape, whereas in Craft they are similar. Thus, as may be seen from Table IV, if relative wages are measured by the respective means, the differential in Production is much wider then in Craft; if by the modes, it is much narrower, and if by the medians, it is not very different. In the circumstances there is a better case for considering these differentials in probability terms once again. Since we are attempting, in effect, a comparison of two pairs of distributions, it will probably be simplest to adopt the second technique illustrated in the article referred to on p. 227 above, and to give the *cumulative* frequency curves for the differences between skilled and unskilled earnings in each pair of distributions. These curves are drawn in Diagram IV. It can be seen that the chances of a skilled man earning *a little more* than an unskilled man were only slightly greater in Production than in Craft departments, but the chances of his earning *a lot more* were far greater. Thus the chance of a skilled man earning at least £1 more than an unskilled was about 72 per cent in Production and about 68 per cent in Craft—that is, between two and three to one ' on '; but the chance of his earning at least £8 more was about 19 per cent in Production but less than 2 per cent in Craft—that is, about four to one against in Production but over sixty to one against in Craft. (The chances of an *unskilled* man earning as much as or more than a skilled man were rather over five to one against, in both cases.)

TABLE IV

Relative Earnings of Skill Grades in Production and Craft

Grade	*Production*			*Craft*		
	mean	median	mode*	mean	median	mode*
Skilled	256/–	229/–	192/6	209/–	204/–	202/6
Unskilled	176/–	179/–	182/6	165/–	168/–	167/6
Unskilled as percentage of skilled...	*69*	*78*	*95*	*79*	*82*	*83*

* See Table II, note †: similar difficulties arise here, but the secondary modes—except in the case of unskilled Production workers—are less pronounced.

As we have already suggested, the very highly-paid skilled Production workers are confined to three departments; and we should, therefore, examine departmental earnings in more detail (Table V). Although base rates (where these exist) in the Production departments broadly reflect skill and responsibility, tonnage payments are often important and sometimes dominant: in the melting shops and the mills, technical developments over the years have

Diagram IV

Cumulative Frequency of Differences in Earnings

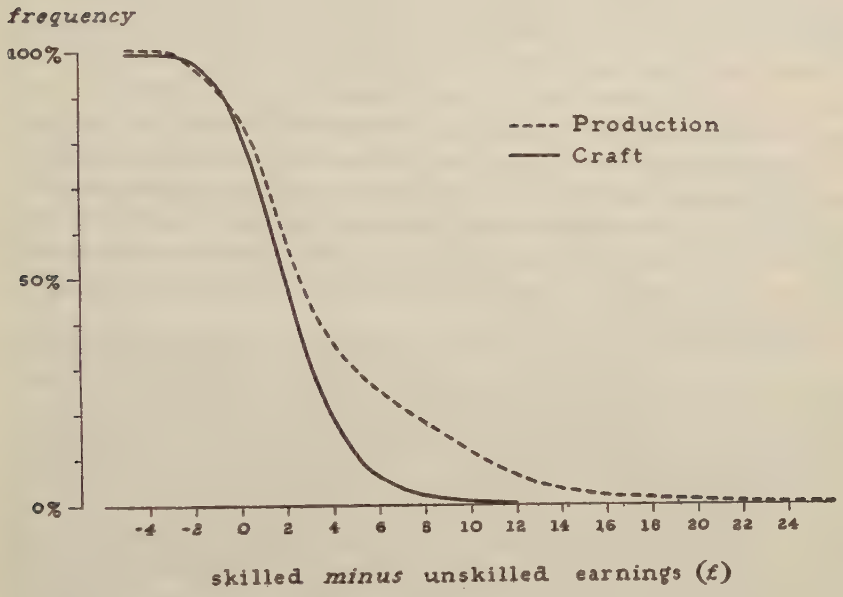

TABLE V

Relative Earnings by Department

Sector and Department	*Mean earnings* skilled	unskilled	unskilled as % of skilled
Production:			
Blast furnaces	200/–	165/–	*83*
Melting shops	326/–	182/–	*56*
Sections mills	367/–	181/–	*49*
Plate mills	359/–	169/–	*47*
Traffic	199/–	183/–	*92*
Production as a whole:	256/–	176/–	*69*
Craft:			
Constructional engineering	235/–	161/–	*69*
Constructional engineering (maintenance) ...	242/–	186/–	*77*
Maintenance	202/–	160/–	*79*
Central engineering Workshops	199/–	157/–	*79*
Miscellaneous Craft	205/–	186/–	*90*
Craft as a whole:	200/–	165/–	*79*

caused output, and therefore tonnage payments, to rise markedly[1]—so that earnings bear a tenuous relation to skill. Because payment by results is on the whole less common and less important in Craft departments, interdepartmental variations in skilled workers' earnings here were not nearly so great. The exceptions were the constructional engineering department and the constructional engineering (maintenance) department, where most workers were in fact on some form of piece rate. As regards unskilled earnings, the differences both between the two sectors (as we have seen) and between departments were much smaller than those in skilled earnings.

There is another important difference between the two sectors, which appears when the departments are examined separately. We saw from Diagram III that there was considerable overlap between the distributions of skilled and unskilled earnings for Production as a whole; but here again the departments differed. In the melting shops and the mills, there was virtually no overlap; but there was a large overlap in the blast furnaces[2] and an almost complete overlap in traffic.[3] These latter departments accounted, in fact, for the blurred picture in Diagram III.

The difference in the relative wages of skilled and unskilled workers, which are so marked in Production, arise as we have seen because of the great variations in the earnings of the small and highly heterogeneous group of skilled workers. On the other hand the semi-skilled in Production, composed as they are of workers on the middle and lower rungs of promotion ladders, are a much larger group (for instance, of a team of six ladlemen in the melting shops, one was rated as skilled and five as semi-skilled). Moreover, they include occupations (*e.g.* crane-driving) common to several departments—which is part of the reason for the greater uniformity in their earnings. There is therefore less variation between departments in the relationship between the average wages of semi-skilled and unskilled workers than between skilled and unskilled.

There is little to add about the actual distributions underlying the relationships summarised (for skilled and unskilled) in Table V. Largely owing to the effect of overtime working, and to some extent of bye-turning, on the part of the unskilled, the overlap with semi-skilled earnings is very extensive. It is not confined to a few departments only; indeed, in the blast furnaces the range of semi-skilled earnings is entirely encompassed by that of the unskilled. If there is any truth in the suggestion made to us that the distinction between ' semi-skilled ' and ' skilled ' on the promotion ladders in Production is one of traditional levels of earnings (and good luck) rather than of actual skill, then it would seem more reasonable to compare the earnings relationship of *semi-skilled* and unskilled in Production with that of *skilled* and unskilled in Craft. They are in fact very similar. In other words, the payment of many skilled workers in Production has become, in the course of time and presumably as the result of able bargaining in a period of technological advance, anomalously high.

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[1] This had happened less in the blast furnaces for reasons discussed later (see p. 252 f.); but since 1951 the balance has been partly redressed.

[2] By 1956–7 this overlap had been somewhat reduced, although by no means eliminated.

[3] There is perhaps a case for removing the traffic department from the Production sector, although these workers come under the Blast Furnace Agreement. The classification of loco drivers as skilled is, as we know, dubious; moreover, the tonnage payments which characterise skilled Production workers form a very small proportion of loco drivers' earnings and are not based on individual or group output but on all material moved anywhere on the site. The exclusion of the traffic department from the Production sector would greatly reduce the overlap of the skilled and unkilled earnings distributions in Diagram III, and would lower the relationship of the means (Table IV and V) from 69 to 57 per cent (and that based on the medians from 79 to 59). This brings out even more sharply the contrast between the relative earnings of skilled and unskilled workers in the two sectors.

III. Special Aspects of Wage Relationships

It is already clear that working and earning conditions in Production and Craft are so different that, if we are to pursue our analysis further, a symmetrical treatment of them is impossible in the nature of things; and we therefore propose to highlight some of the more characteristic aspects of wage payment in each.

(a) *For Craft workers: (i) relative ' earnings gaps ' (in weekly earnings, hourly earnings, and ' pay per hour paid ')*

So far, the basic data for our examination of wage relationships between skill grades have been the average normal weekly earnings of individuals within these grades. But a worker's weekly earnings may include a number of items unrelated in principle to skill—on the one side, payment for overtime hours worked, premia attached to these hours or (in the case of shiftworkers) to the timing of particular shifts; and, on the other, merit rates, production bonuses, lieu rates, or straight piecework payments. All these elements will obviously contribute to a total earning considerably in excess of the time rate fixed for a standard 44-hour week and, if the resulting ' earnings gap ' is different for skilled and unskilled workers—as it is in engineering and probably in most other industries—the differential prescribed by the wage rates will be a poor guide to the actual difference in earnings. We have come to regard this as a commonplace of wage relationships in manufacturing industries: the unskilled worker is notoriously at a disadvantage in *hourly* earnings, in as much as he has, on the whole, less opportunity of making money on piecework and enjoys fewer special payments than the skilled man—although he may be able to make up for this to some extent in *weekly* earnings by working longer hours. In the maintenance department—the core of the Craft sector in this firm, and in many ways typical of it—there were very wide ' earnings gaps,' both in weekly and in hourly earnings; but the strange feature is that these gaps were proportionately almost identical, on average, for skilled and unskilled workers—so that the wage relationship between the two groups is stable on every measure. Thus the average of *negotiated time rates* of wages for unskilled workers was 79.6 per cent of that for the skilled; the average of their *weekly earnings* was 79.1 per cent; of their *hourly earnings* (or pay per hour actually worked), it was 79.3 per cent; and of what may be called *their* *effective* hourly rates of pay (or pay per hour paid)[1] it was 81.1 per cent.[2]

The earnings gaps—*i.e.*, the extent to which earnings exceed time rates—are compared for skilled and unskilled maintenance workers in Diagram V. This diagram shows the distribution of the gap for workers' (i) weekly earnings, (ii) hourly earnings, and (iii) effective hourly rates of pay, each expressed as a percentage of their time rates.[3]

In weekly earnings, the average excess was 43.2 per cent for the skilled and 43.7 per cent for the unskilled. The total range of the skilled distribution is wider than that of the unskilled, the tail of each distribution being accounted for by a few individuals—bricklayers and bricklayers' labourers—who are apt to make very high piecework earnings. Indeed, it is payment systems and the organisation of work which mainly account for the shapes of the distributions. But what might otherwise be a fairly clear separation between timeworkers and pieceworkers on the one hand, or dayworkers and shiftworkers on the other, is obscured by the variety of combinations of methods of payment; thus a dayworker receiving large piecework bonuses will earn a greater excess, on average, than a shiftworker on pure time payment.

In hourly earnings, *i.e.* after the removal of most of the effect of overtime working on earnings, the average excess is reduced to 27.5 per cent for the skilled and 27.4 for the unskilled. The point of interest here is the similarity of so considerable a reduction for both skilled and unskilled. As we know, the unskilled usually work, on average, substantially longer hours per week than the skilled; here, the difference was about three-quarters of an hour. The excess in effective hourly rates of pay (*i.e.* after the removal of overtime and shift premia from earnings) was 7.6 per cent for skilled workers and 9.4 per cent for unskilled—figures which indicate the relative contributions made by piecework bonuses and similar payments to total earnings.[4]

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[1] The distinction between 'hourly earnings' and 'effective hourly rates of pay' is as follows. The total of a worker's weekly earnings is divided, in the first case, by the number of hours *which he actually works*, and in the second by the number of hours *for which he is paid*. For example, a worker on a standard week of 44 hours may work 12 hours overtime—4 on Saturday afternoon and 8 on Sunday. The total hours he works will then be 56; but, if overtime on Saturday is paid at 'time-and-a-half' and on Sunday at 'double time,' the total hours for which he is paid will be 66. 'Hourly earnings' therefore include overtime (and shift) premia, while 'effective hourly rates of pay' do not. (The latter may sometimes exclude rather more than these premia, since for certain workers the tonnage element in their pay attracts no premium at all or else attracts a lower premium that does the time rate).

[2] It was impracticable to repeat the present analysis for every Craft department; but two further examples of the stability of differentials may be given. In the central engineering workshops, the time rates of unskilled workers were 76.5 per cent of those of skilled, while weekly earnings were 78.8 per cent. In constructional engineering, the average pay per shift paid of unskilled workers was 64.4 per cent of that of skilled, while weekly earnings were 68.4 per cent. In Production departments, as we shall see, there is nothing like this stability.

[3] *Weekly earnings* are average normal weekly earnings as previously defined: *i.e.*, the average earnings for all normal weeks in the year. Figures for *hourly earnings* and *effective hourly rates of pay* were available only for the two sample weeks (see Appendix); and these were therefore averaged. (That these sets of figures are comparable is sufficiently clear from the remarkable similarity of the distributions for the maintenance department of average normal weekly earnings and average earnings for the two sample weeks.)

[4] The time rates used in these calculations are those in force in the first of the two sample weeks. Small cost-of-living changes occurred in these rates in the course of the year, which amounted to an increase of 0.66d. per hour by the second of the two weeks. As this represented no more than 1.3 and 1.7 per cent of skilled and unskilled hourly earnings, it was neglected; so that it figures in this residual excess payment.

Diagram V

Excess of Earnings over Rates

(maintenance department)

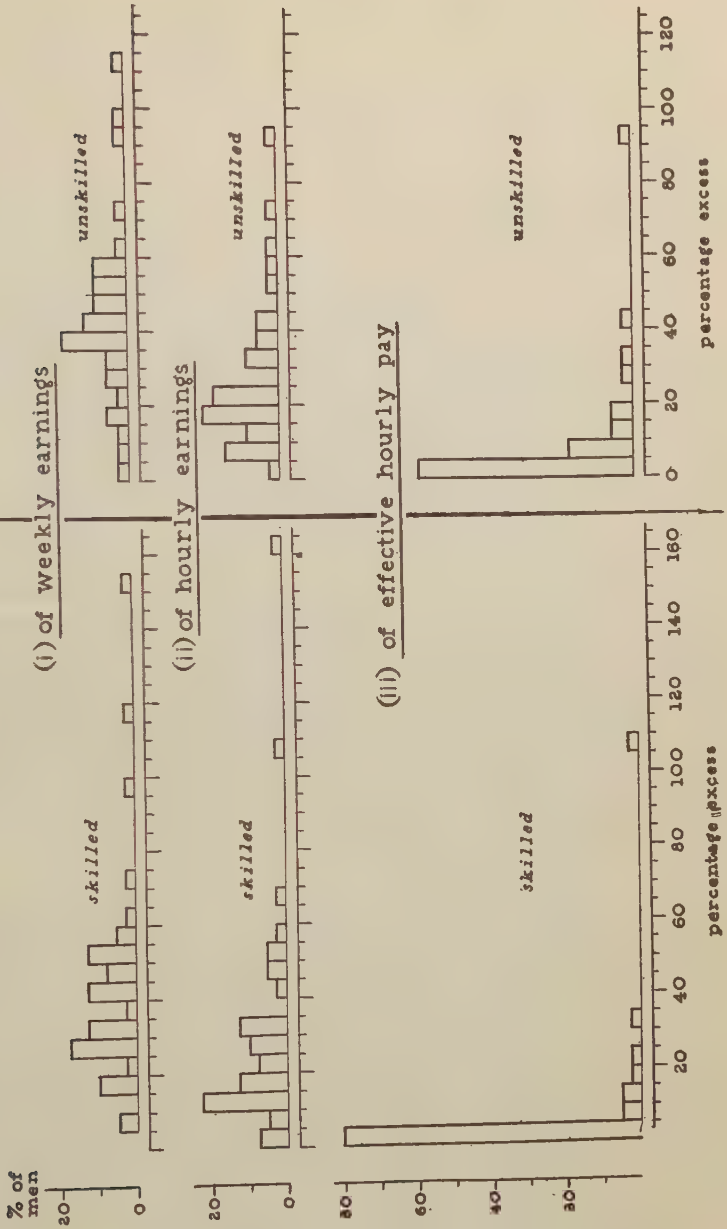

TABLE VI

Composition of Skilled and Unskilled Earnings in Maintenance

Component	*Percentage contribution to average earnings* skilled	unskilled
Time rate	56.8	56.3
Payment for overtime hours (excluding premium)	17.5	16.3
Overtime and shift premia	19.9	18.0
Bonus and piecework payments	7.6	9.4
Total	100	100

This analysis of the earnings gap for skilled and unskilled maintenance workers may now be summarised by showing, in Table VI, the composition of average earnings for each group. Thus the unskilled worked fractionally longer hours, although at slightly less advantageous times; but their bonus and piecework earnings were proportionately a little higher. However, all these differences might be due to sampling fluctuations; and it is to the similarity in the composition of skilled and unskilled earnings that the stability of their relative wages (however the relationship is measured) is to be attributed.

(ii) *Minor differentials due to payment systems and work organisation*

In using the term 'minor' differentials we do not imply that the wage differences in question are necessarily small or unimportant, but only that they are not related to any major distinction of skill or responsibility. To call them minor is not to dismiss all differentials which cannot be related to skill; some of them may possibly be related to genuine differences in job content; but many of the traditional differences in earnings between workers of comparable skills appear hard to justify on rational grounds—except perhaps on those of keeping the industrial peace.

(1) *Between groups of skilled craft workers on similar wage rates*

We selected from our sample eighty-one workers, drawn from a number of Craft departments—constructional engineering, constructional engineering (maintenance), maintenance, central engineering workshops, and pattern shop & foundries. All these men were classified as skilled, although they were paid at rather different time rates ranging from 3/1.77*d.* per hour (*e.g.* pipe fitters, and painters & decorators) to 3/7.06*d.* per hour (a single chargehand patternmaker). However, when these workers are grouped—as we propose to group them—according to the systems by which they are paid and the ways in which their work is organised, the differences in their time rates are largely averaged out.

There are four main systems by which these workers were paid (timework, piecework, timework and piecework combined, and 'taskwork'), and two under which their work was organised (dayworking and shiftworking). Those on *timework* are paid a time rate only (with premia where applicable for shiftworking and overtime working).[1] Those on *piecework* are paid wholly by results—except for the cost-of-living bonus of about 1*s.* an hour. Those on a *combination* of timework and piecework are paid a time rate, but with some piecework or tonnage bonus. Those on *taskwork* are paid for specific tasks which involve a number of workers over a considerable time, each worker being paid a ‘ drawing rate ’ well above his normal time rate. The drawing rate is nominally an interim payment to be adjusted on completion of the task; in practice the adjustment is never downwards, and indeed the drawing rate is sometimes analogous to the lieu rates common in shipbuilding (*i.e.* enhanced time rates for ‘ working at piecework speed ’). The two familiar systems of work organisation operated as follows. *Dayworkers* worked a 44-hour standard week—usually Monday to Friday from 7.30 a.m. to 12 noon and from 1 p.m. to 4.30, and Saturday from 7.30 to 11.30—all work outside these hours being overtime. For *shiftworkers*, the timing and length of the standard week varied according to the particular rota established by the firm:[2] all the workers in question did some night work, but not all did weekend work. For individual weeks, the percentage premium varied between as wide limits as 9 and 56. The three rotas gave *average* premia of 26, 36, and 42 per cent.

These four payment systems and two work systems could theoretically give rise to sixty-four mixed work-and-payment systems, of which twelve were found to be actually in operation among our selected workers, as is

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[1] Towards the end of the income-tax year in question, craftsmen were given an increase which took the form of a small bonus on the output of the whole works. The presence of this ‘ tonnage ’ element does not materially affect the analysis which follows.

[2] There were three main rotas for Craft workers, whose payments were affected as follows:

Rota	*Shifts worked*	*Hours worked*	*Hours paid*	*Percentage premium*
I. *7-week:*	6	45	56	*24*
	5	37.5	54	*44*
	6	45	66.4	*48*
	7	52.5	71.1	*35*
	5	37.5	53.6	*43*
	6	45	70	*56*
	7	52.5	75.9	*44*
Average	6.0	45.0	63.9	*42*
II. *4-week* :	6	45	56	*24*
	5	37.5	54	*44*
	3 shifts and 3 days	46.5	61.6	*32*
	7	52.5	74.4	*42*
Average	6.0	45.4	61.5	*36*
III. *3-week* (no weekend working):	5	37.5	48	*28*
	6	44	48	*9*
	5	37.5	54	*44*
Average	5.3	39.7	50.0	*26*

shown in Table VII. Although dayworking and shiftworking are obviously not mutally exclusive (a shiftworker may on some occasions be asked to work by the day, and *vice versa*), we are excluding, for the sake of simplicity, the 9 workers in the 'day and shift' column of the table, and grouping the remaining 72 into four categories according to their *main* work-and-payment systems. The grouping indicated in the table gives the following numbers of workers in our four categories:

(a) *time/day*, 36; (b) *time/shift*, 20; (c) *task/day*, 13; (d) *task/shift*, 3. Categories (a) and (b) include workers paid primarily by time, (c) and (d) those paid primarily by results.

In terms of time rates only, the biggest difference in average wages between these groups is no more than 1 per cent (Table VIII); and we can therefore neglect the effect of rates as contributing to the very wide differences which nevertheless appear in both weekly and hourly earnings. In Table IX we show the relative average weekly earnings, hours worked, and hourly earnings of each of the groups (with the time/day group as base). These relationships are given for each of the two sample weeks; and the inclusion of relative *annual* earnings (in column 1 of the table) for comparison with weekly earnings, suggests that the weeks in question were reasonably representative.[1]

In general, dayworkers work considerably longer hours than shiftworkers; in part (in this case to the extent of about 6 per cent) this is because a shiftworker's shift is shorter than a dayworker's day.[2] Another 5 or 6 per cent arose from dayworkers working overtime. Even so, dayworkers received about 11 per cent less than shiftworkers, because of the large premia the latter enjoy. In hourly earnings, the shift differential averaged about 25 per cent for timeworkers, and this would have been as high as 36 per cent if there had been no overtime for those on daywork. (The differences are smaller for taskworkers, since their premia are calculated on their time rates—which are considerably lower than their drawing rates). The *payment-by-results* differential was over 30 per cent for dayworkers, but probably well under 20 per cent for shiftworkers. The extreme difference in earnings was that between a dayworker paid by time and shiftworker paid by results: the latter was paid from a third to a half as much again per hour.

These differentials between groups of workers of comparable skill are defended, in general, on the grounds that shiftworkers are called upon to work at more inconvenient hours than are dayworkers—and that workers paid by results work more intensively than those paid by time. It might also be thought that different work and payment systems would reflect differences in job content. Obviously, the primary job of shiftworking fitters is to keep the plant working, and therefore breakdowns and threatened breakdowns

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[1] Except for the task/shift group in week II—where the low weekly earnings are accounted for both by short hours and lower hourly earnings.

[2] A shiftworker works 7½ hours in each shift and is allowed a half-hour paid mealtime. Since he is not permitted to leave the works during his mealtime, it is arguable that the shift should be regarded as one of 8 hours. In this light, the shift differentials per hour shown in Table IX are over-estimates.

TABLE VII

*81 Skilled Craft workers according to their Work-and-Payment Systems**

Payment system	*Work organisation* day	shift	day & shift
Timeworkers	35(*a*)	15(*b*)	6
Timeworkers with bonus	1(*a*)	5(*b*)	2
Pieceworkers†	2(*c*)	—	—
Taskworkers	6(*c*)	—	—
Time- and taskworkers	—	—	1
Piece- and taskworkers	—	1(*d*)	—
Time-, piece- and taskworkers	5(*c*)	2(*d*)	—

* The letters in italics indicate our final classification as given below.
† *I.e.*, paid by the piece, except only for the cost-of-living bonus.

TABLE VIII

Relative Average Time Rates for Different Work and Payment Systems*

Rate per hour	*Examples of jobs*	*Number of workers in group* time/ day	time/ shift	task/ day	task/ shift
3/1/77d	Pipe fitter; painter & decorator... ...	6	—	—	—
3/2.22d	Riveter	—	—	2	1
3/2.69d	Fitter; electrician	16	14	—	—
3/3.14d	Plater; electric welder	2	4	11	2
3/3.60d	Brass, steel & iron moulder	6	—	—	—
3/4.05d	Toolroom fitter	2	1	—	—
3/4.60d	Patternmaker	1	—	—	—
3/5.12d	Examiner	—	1	—	—
3/5.69d	Painter & letterer	2	—	—	—
3/7.06d	Charge-hand patternmaker	1	—	—	—
	Total of workers in group:	36	20	13	3
	Average rate per hour:	3/3.13d	3/2.98d	3/3.00d	3/2.73d
	Relative average rate per hour (time/day =100)	*100*	*99.7*	*99.8*	*99.0*

*As at week I of the two sample weeks (see p. 263).

TABLE IX

Relative Earnings and Hours for Skilled Craft Workers

Group	*Average annual earnings*	*Average weekly earnings* wk. I	wk. II	*Average hours worked* wk. I	wk. II	*Average hourly earnings* wk. I	wk. II
Time/day	*100*	*100*	*100*	*100*	*100*	*100*	*100*
Task/day	128	127	134	95	103	133	131
Time/shift	113	111	111	89	88	125	124
Task/shift	124	125	108	85	79	148	136

must have priority; but otherwise the content of their work is very much the same as that of dayworking fitters. Any differences that exist are certainly not large enough to justify such differentials. Shiftworkers in Production departments do not enjoy such wide differentials; and on the surface it seems unlikely that the long hours of dayworkers are so much less ' inconvenient ' than most rota arrangements. The fairness of the taskworkers' differential might also be questioned: it had the effect that semi-skilled taskworkers (whose earnings are not cited here) were earning considerably more than skilled timeworkers.

(2) *Between shiftworking and dayworking fitters*

Since the shiftwork differential is one of the most pronounced and best accepted of ' minor differentials ', it is worth examining a little more fully. We propose to select fourteen fitters, of whom 8 were on daywork and 6 on shifts. Apart from the possible minor distinction in the content of their jobs, these form a wholly homogeneous group—all skilled men, on a rate of 3/2.69*d.* per hour (in week I). The weekly earnings, hours worked, and hourly earnings of these workers are given in Table X. On the average of normal weeks, shiftworkers' earnings exceeded dayworkers' by some 8 per cent. The narrowness of this differential is clearly due to one high (D1) and one very high (D4) daywork earner. The latter, in fact, earned more per week than any shiftworking fitter; but he is something of a special case as he was attached to the tarmac department[1] although the firm continued to classify him according to his department of origin (maintenance).[2] If we excluded both these workers the shiftwork differential in weekly earnings would widen from 8 to 14 per cent; but this would still be narrower than the 16 per cent differential in hourly earnings (or, if we again exclude D1 and D4, 18 per cent).

We can see more clearly how these shiftwork differentials arise if we proceed to separate (in Table XI) the components of average weekly earnings: (i) the pay for average hours worked at the plain time rate, (ii) the average premia for overtime and/or shiftworking, and (iii) the average bonuses (or ' lump payments ' of one kind or another). Bonus payments, where these were made, were small and have a negligible effect on the differentials which, as one might expect, are almost entirely due to the higher premium payments of the shiftworkers. Indeed, if a dayworker was to equal or better the weekly earnings of a shiftworker, he had to work extremely long hours: thus D4 worked nearly 60 hours a week—and even so his premia were smaller than those of S1, S2, S3 and S5 (who worked on average 13 to 16 hours less per week, or barely three-quarters as long). This leads one to question the stock justification of the shiftwork differential as a compensation for working

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[1] Exceptionally long hours were being worked in the tarmac department: well over 60 a week was not uncommon.

[2] All the dayworkers, and one (S3) of the shiftworkers, were drawn from the maintenance department, whereas the other shiftworkers came from the central engineering workshops. However, as we shall see, it would be wrong to imagine that the shiftwork differential is being distorted by a departmental differential.

TABLE X

Average Earnings and Hours of Day and Shift Fitters*

Group and number	*Weekly earnings*	*Hours worked*	*Hourly earnings (s.)*
Dayworkers:			
D1	201/–	50.1	4.01
D2	184/–	47.7	3.86
D3	142/–	42.7	3.32
D4	238/–	59.1	4.03
D5	186/–	47.8	3.89
D6	177/–	47.8	3.73
D7	164/–	46.9	3.50
D8	173/–	48.0	3.61
Dayworkers' average	183/–	48.7	3.74
Shiftworkers:			
S1	201/–	43.5	4.62
S2	200/–	45.3	4.41
S3	224/–	45.8	4.89
S4	176/–	42.9	4.11
S5	197/–	43.8	4.50
S6	187/–	44.9	4.16
Shiftworkers' average ...	198/–	44.4	4.45

* In this and the following table, two very small fluctuating elements are omitted from the earnings figures: (a) cost-of-living changes after week I, (b) a ' craftsmen's bonus ' which began to be paid to some workers early in 1951.

TABLE XI

Composition of Average Earnings of Day and Shift Fitters

Group and number	*Average earnings*						
	*pay for hours worked**	*per cent*	*pre-mia*	*per cent*	*bonus pay-ments*	*per cent*	*total weekly earnings*
Dayworkers:							
D1	161/–	*80*	31/–	*15*	9/–	*5*	201/–
D2	154/–	*84*	25/–	*13*	6/–	*3*	184/–
D3	173/–	*97*	5/–	3	—	—	142/–
D4	190/–	*80*	46/–	*19*	2/– ...	*1*	238/–
D5	154/–	*83*	18/–	*9*	14/–	*8*	186/–
D6	153/–	*86*	17/–	*10*	7/– ...	*4*	177/–
D7	151/–	*92*	13/–	*8*	—	—	164/–
D8	155/–	*89*	18/–	*11*	—	—	173/–
Dayworkers' average	157/–	*86*	21/–	*11*	5/–	*3*	183/–
Shiftworkers:							
S1	140/–	*70*	59/–	*29*	2/–	1	201/–
S2	146/–	*73*	54/–	*27*	—	—	200/–
S3	147/–	*66*	57/–	*25*	20/–	*9*	224/–
S4	138/–	*78*	38/–	*22*	—	—	176/–
S5	141/–	*72*	53/–	*27*	3/–	*1*	197/–
S6	145/–	*77*	42/–	*23*	—	—	187/–
Shiftworkers' average	143/–	*73*	51/–	*25*	4/–	*2*	198/–

* *I.e.* the time rate × average hours worked.

at inconvenient times—the more so, as the social life of a steel town is likely to be geared to shiftworking in any case. It may be answered, of course, that—in theory at least—dayworkers are free to choose whether and when it is convenient for them to work overtime, whereas shiftworkers are tied to a set rota. While it is doubtful how much autonomy these dayworkers were actually able to exercise in practice, we can make maximum and minimum estimates[1] of the number of hours which they worked *instead of*, rather than *in addition to*, the standard week (Table XII). All the workers except D4 must have worked some overtime instead of standard hours—*i.e.* they must, on occasion, have worked outside standard hours even though they had not worked a full week (although it is only for D1 and D2 that both minimum and maximum estimates are substantial). Thus the dayworker can narrow the shiftwork differential on weekly earnings in two ways: chiefly, as we have seen, by working long hours, but also to some extent, as in this case, by ' substituting ' overtime hours for standard hours.

Both these opportunities—such as they are—are denied to the shiftworker, who normally cannot work overtime (unless it is possible for him to work two shifts running) and is unable to ' substitute ' a higher-rated shift for a shift missed. In other words, daywork is more flexible than shiftwork, if only because a worker who is absent for part of a shift normally has to miss the whole shift. Table XIII illustrates the relative inflexibility of the shiftworker's working week, by comparing the ratio of ' gift ' hours to hours worked *as prescribed* by his rota with the *actual* ratio as indicated on his clock cards.

Except in the case of S3, the proportion of premium actually earned never came up to the level prescribed. Significantly enough, S3 was a worker whose rota included three consecutive days on daywork[2]; and it seems probable that this peculiarity of his work arrangement accounts for his ability to exceed his prescribed level of premium. The table suggests that for ' pure ' shiftworkers the prescribed level is in effect the maximum obtainable. No worker can raise the proportion of his ' gift ' earnings, or, should he miss a shift for some reason, even compensate himself fully for the loss. All in all, however, it remains true that the dayworker has the worse of the bargain in that, if he is to catch up with the shiftworker in weekly earnings, he will have to work very much longer—and therefore hardly less inconvenient—hours.

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[1] These estimates were obtained as follows. We know from the workers' clock cards (a) the number of *hours actually worked* per week, and (b) the number of *premium or ' gift ' hours* (i.e. hours paid but not worked). The latter represented payment *either* at time-and-a-half *or* at double time. Thus

$$\frac{\text{`gift' hours}}{2} - (\text{hours worked} - 44)$$

equals the minimum number of overtime hours which *must* have been worked instead of standard hours, and

$$\text{`gift' hours} - (\text{hours worked} - 44)$$

equals the maximum number of such hours which *may* have been worked.

[2] See p. 242, n. 2.

TABLE XII

Analysis of Overtime for Dayworking Fitters

Worker	*Average hours worked*	*Average 'gift' hours*	*Estimate of hours worked as overtime instead of standard hours*	
			minimum	maximum
D1	50.1	9.4	3.3	12.7
D2	47.7	7.6	3.9	10.5
D3	42.7	1.4	2.7	4.1
D4	59.1	14.2	—	13.3
D5	47.8	5.4	1.6	7.0
D6	47.4	5.3	1.9	7.2
D7	46.9	3.9	1.0	4.9
D8	48.0	5.6	1.6	7.2

TABLE XIII

Basis of Premium Payments to Shiftworking Fitters

Worker	*Rota*	*'Gift' hours as percentage of hours worked*	
		prescribed	*actual*
S1	7-week	42	41
S2			37
S5			38
S4	2-week	33	28
S6			29
S3	4-week	36	39

(b) *For Production workers*

The chief features of the remuneration of Craft workers were on the one hand the general stability of wage relationships between skilled and unskilled, and on the other the importance of minor differentials arising from systems of payment and work organisation. Neither of these features is found in Production, for three main reasons. Firstly, pure time rates are much less common; secondly, the unskilled work far longer hours than the skilled; and thirdly, there is a very large amount of bye-turning (undertaking higher-rated jobs). The first of these means that our analysis has to be conducted entirely in terms of earnings.

(i) *Effects on relative earnings of* (1) *variations in length of working week*

For Production workers, the information we have is rather different from that available for Craft workers. Whereas for the latter our information was confined to two specimen weeks, for the former the income-tax cards show the number of shifts paid in each week of the year. Of course, such figures do not tell us the length of a man's working week. For Craft workers, this would have been a serious handicap because the premia for shiftworking were large; for Production workers, however, they were much smaller (Table XIV) both because weekend premia were lower and because no premia were payable for afternoon or night work. This is simply due to the fact that the premia for Production workers have grown up against the background of

TABLE XIV

Shifts as Paid in Production Departments

Department and skill	*Average number of shifts paid:*		*Percentage premium (theoretical)*
	in normal weeks	*according to rota (theoretical)**	
Blast furnaces:			
skilled	6.55	6.71 (6.00)	*12*
unskilled	7.50		
Melting shops:			
skilled	6.38	(a) 6.73 (6.00)	*12*
unskilled	7.40	(b) 6.76 (6.00)	*13*
Section mills:			
skilled	5.95	(a) 5.83 (5.67)	*3*
unskilled	7.37	(b) 6.77 (6.00)	*13*
Plate mills:			
skilled	5.91	(a) 5.83 (5.67)	*3*
unskilled	7.01	(b) 6.77 (6.00)	*13*
Traffic:			
skilled	6.85	6.71 (6.00)	*12*
unskilled	6.96		

Note. All departments also included some dayworkers, who worked 5½ days and were paid for 6—which was equivalent to receiving a premium of 9 per cent. (Premium rates at present are rather higher than those shown in this table.)

*The figure in brackets denote the number of shifts worked if the rota were adhered to rigidly. In the melting shops and the mills, there were two set rotas, indicated above by (a) and (b): in the melting shops these differed very little, but in the mills (b) includes week-end work.

shiftworking, while the premia for Craft workers reflect, by and large, the sort of practices found in engineering and other non-shiftworking industries.

The difference between skilled and unskilled hours is brought out clearly in Diagram VI, where the weekly earnings distributions for the three grades of skill are contrasted with those of effective shift rates (*i.e.* ‘ pay per shift paid.’). When we compare these wage distributions for skilled and unskilled workers in Production departments as a whole, the overlap in effective shift rates is far smaller than in weekly earnings; and the differential based on the means widens from 31 per cent to 40 (or, excluding the traffic department, from 43 per cent to 55). Moreover, this is true for each separate department: the overlap in effective shift rates is smaller than in weekly earnings, and the differential is wider (Table XV).

It is of course not possible to say exactly how much of the rather better relative position of the unskilled in weekly earnings is due to their having worked longer hours and how much is due to their having received higher premia for their longer hours. As however the unskilled rarely received more than time-and-a-half for overtime, the large differences in the number of shifts paid must reflect large differences in the number of shifts worked. While, as can be seen from Table XIV, the number of shifts paid for skilled workers lay near (or below) the theoretical rota figure, for the unskilled it lay far above—traffic being, as usual, the exception. Long hours are expected of labourers: in every department, they appear to have worked some overtime in at least one and sometimes two out of every three weeks. The skilled, on

Diagram VI

Distribution of Weekly Earnings & Effective Shift Rates in Production

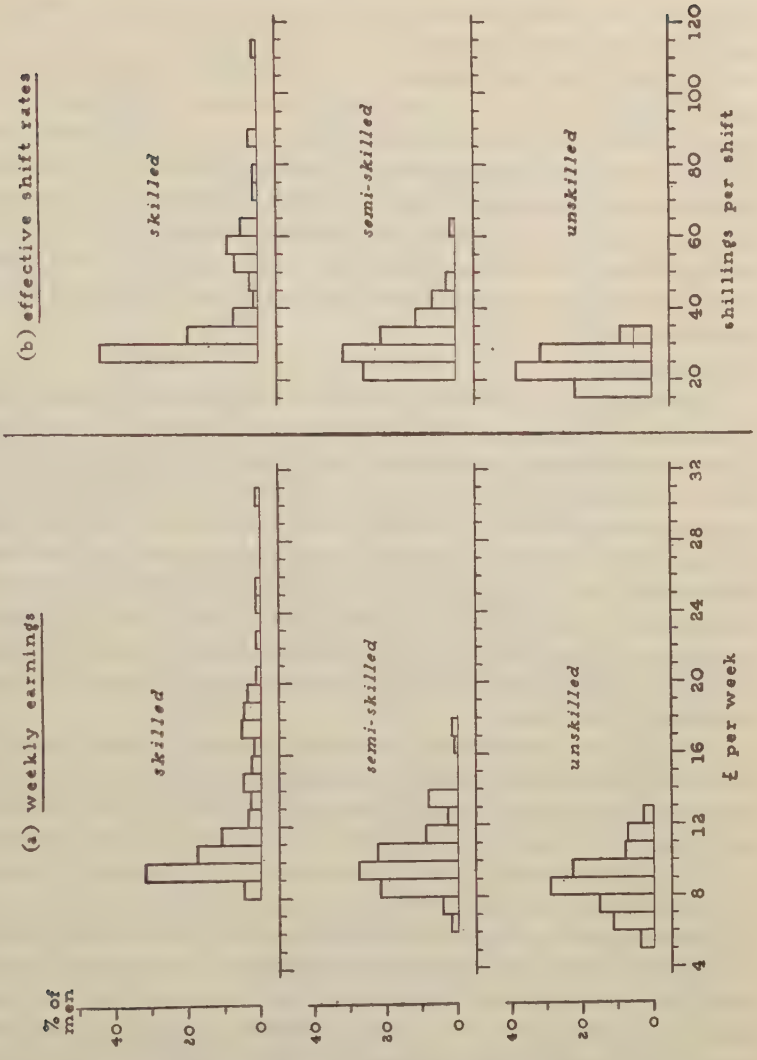

TABLE XV

Relative Weekly Earnings and Effective Shift Rates in Production Departments

Department	*Unskilled as percentage of skilled:* means of average weekly earnings	means of average effective shift rates
Blast furnaces	83	73
Melting shops	56	47
Section mills	49	39
Plate mills	47	39
Traffic	92	90
Production as a whole:	69	60
—*without Traffic*	*57*	*45*

Note. Figures for 1956–7 would show a rather wider differential for the blast furnaces, and a rather narrower one for the melting shops. For the mills, the limited information we have suggests little change.

the other hand, if they worked any overtime at all, did so—except in traffic—only about once or twice a year.

The position of the semi-skilled may be briefly noted. On the whole, they were working a slightly longer week than the skilled, but a considerably shorter week than the unskilled. The earnings differential of the semi-skilled over the unskilled proved (like that of the skilled) to be rather wider in effective shift rates than in weekly earnings—in terms of the means, 22 and 15 per cent respectively. Again, the two distribution of effective shift rates overlap rather less than do those of weekly earnings—and again, both of these statements apply not only to Production as a whole but to each department separately.

(2) *Bye-turning*

Bye-turning, or deputising for other workers, is widespread in most of the Production departments. While it was most common in the blast furnaces (which we are using as an example here) because of the expansion which took place in this department over the period when our data were collected, there was a great deal of it in the melting shops and the mills as well. It is obviously not unknown in industry at large: in a continuous working industry, sickness, absenteeism, and holidays are bound to give labourers the chance of working at a variety of jobs other than their own. Moreover, in the tight labour market prevailing, an assurance of being allowed to work at higher-paid jobs from time to time has been an important means of attracting and holding an unskilled labour force.

We propose to analyse the earnings of twelve labourers—members of what is nominally the lowest group in the industrial hierarchy—whose weekly earnings were nevertheless higher on average than those of unskilled workers on the first rung of the blast-furnace promotion ladder (and of a number of semi-skilled workers as well). These higher earnings were primarily due to extensive overtime (which they worked in nearly three-quarters of their normal weeks), but were also due to a good deal of bye-turning. The extent of the latter can be seen from Table XVI, which indicates the hours they worked at differently-rated jobs. Even so, the table—which has been simplified for presentation—conceals a great deal of the variety of the work performed by some of these men. Only three of them worked at ‘ pure ’ labouring alone throughout the year; nos. 1, 2, 3 and 5 bye-turned from a third to half their time, no. 7 almost three-quarters of his time, and no. 6 hardly did anything else.

In Table XVII we give the overall effective hourly rate for each worker, together with that for labouring and for bye-turning separately; thus the difference between the overall rate and the labouring rate is a measure of the extent to which bye-turning raised the worker's earnings. Thus, on average over the whole year, the earnings of nos. 1, 2, 3, and 7 were raised by 4*d.* or 5*d.* per hour paid; those of no. 5 by 6*d.*, and those of no. 6 by as much as 10*d.* an hour (*i.e.* by the equivalent of—for example—three or four times the biggest national wage increase in the engineering industry). The effect of bye-turning would obviously have been greater still if more of it had occurred

TABLE XVI

Average Hours Worked at Different Types of Labouring and Bye-Turning

Worker	*Hours worked per week*	*—of which:*				
		labouring			*bye-turning*	
		(A)*	(B)†	piecework	(X)‡	(Y)§
1	56.0	—	31.1	—	16.9	8.0
2	54.7	33.6	—	2.5	—	18.6
3	53.4	1.2	24.8	4.4	19.1	3.8
4	56.6	56.6	—	—	—	—
5	48.7	1.0	15.9	2.8	25.2	3.8
6	48.7	3.1	—	—	45.4	0.2
7	48.7	8.5	3.4	0.8	36.0	—
8	47.3	46.9	—	—	0.4	—
9	58.8	57.6	1.2	—	—	—
10	46.3	46.3	—	—	—	—
11	53.8	53.8	—	—	—	—
12	48.4	47.9	—	—	0.9	—

* At 2.16 shillings per hours, possibly with some tonnage payment in addition.
† At 2.30 to 2.32 shillings per hour, possibly with tonnage additions.
‡ At 4s. an hour or less.
§ At more than 4s.

TABLE XVII

Effective Hourly Rates of Blast Furnace Labourers

Worker	*Effective hourly rate (shillings)* overall	labouring only	bye-turning only
1	3.19	2.87	3.68
2	2.81	2.42	3.64
3	3.06	2.63	3.61
4	2.60	2.60	—
5	3.19	2.68	3.58
6	3.10	2.24	3.17
7	2.86	2.52	2.99
8	2.74	2.73	2.93
9	2.16	2.16	—
10	2.22	2.22	—
11	2.19	2.19	—
12	2.19	2.17	3.33

TABLE XVIII

Basis of Premium Payments to Blast Furnace Labourers

Worker	*'Gift' hours as percentage of hours worked* overall	labouring only	bye-turning only
1	11.6	11.2	12.4
2	25.8	28.3	21.0
3	11.4	12.2	7.0
4	14.1	14.1	—
5	12.5	12.7	12.4
6	2.7	16.1	0.2
7	13.3	15.0	12.8
8	16.9	17.1	0.1
9	11.2	11.2	—
10	35.8	35.8	—
11	15.1	15.1	—
12	12.7	12.7	—

outside standard hours; but, as Table XVIII suggests, it is labouring rather than bye-turning which was done in overtime. The table compares the average number of ‘ gift ’ or premium hours as a proportion of the average number of hours worked, and gives the corresponding proportions for labouring only and for bye-turning. In every case but no 1, the proportionate premium on bye-turning was lower than in labouring: for no. 6, who bye-turned almost all his time, it was negligible—*i.e.* he bye-turned almost exclusively during standard hours.

Thus, for many unskilled Production workers, bye-turning as well as overtime working exerts a distinct and marked effect on their relative earnings position. The base rate for blast-furnace labourers was, as we have seen, only about 2/2*d*. an hour; the average effective rate for ‘ pure ’ labouring (including tonnage and other additions) ranged up to about 2/10½*d*; but bye-turning increased this range to over 3/2*d*.

(ii) *Occupational differentials*

We have already stressed the differences in the concept of skill between the Craft sector, where skill is conventionally related to apprenticeship, and the Production sector, where it is not—and where there is no other single criterion. The Production workers classified as skilled comprise a number of heterogeneous occupations at very different levels of earnings. Although there are clearly differences in skill between occupations which fall in the same broad skill grouping, it is by no means clear that differences in earnings are related to such differences in skill (some of them seem explicable by reference only to historical differences in bargaining power); and it therefore seems most reasonable to pursue our analysis of wage differentials simply in terms of occupation. Thus the marked differentials between departments, which we have already noted, are partly occupational differentials; while within departments there are often several distinct occupational groups, each with its own internal wage structure related to its promotion ladder. It would clearly be impracticable to attempt a comprehensive survey of occupational differentials and, while no single department can by definition be wholly typical, the melting shops—the heart of the productive process—are probably the best example we can select. In the first place, conditions in the melting shops are certainly not unique; they closely resemble those in the section and plate mills; secondly, steel melters are of intrinsic interest as having apparently been able largely to resist the all-but-universal trend towards wage equalisation; and thirdly, there has hitherto been very little information on their actual wage position.

In the melting shops there are two major sets of wage relationships; that between the skilled men of various occupational groups on the one hand, and the unskilled on the other (see above, pp. 228 ff.), and that between the melting team as a whole and its ancillary workers. In addition, within each of these groups—melters and ancillary workers—there exists a separate set of wage relationships between the senior and less senior members (*i.e.* the so-called promotion ladder). The complexity of these structures can be fully understood only in terms of the historical background, which is broadly as follows.

In the nineteenth century, the payment system in the melting shops—as in other Production departments in this industry (and in so many other industries)—was the contract rate system. Only the most highly skilled workers, the first-hand melters, were paid—on piece rates—by the employer; and they in turn employed and paid—on straight time rates—the other members of their furnace team. By the end of the century, a sliding-scale element, based on the selling price of steel, had been introduced into the wages of first-hand melters in most districts. There was, however, no national agreement, and wage determination varied from firm to firm.

Under the contract system, the first hands had established enormous differentials between themselves and the rest of the men in the melting shops. The first national agreement in 1905 attempted to ameliorate the position of the lower grades. It abolished the contract system; it extended piecework payments to all melters; and it provided that the sliding scale should apply to all workers, including the ancillary workers (most of whom were by now earning some tonnage payments in addition to their time rates). The agreement further stipulated that there were to be no changes in rates, except under the sliding scale,[1] unless these could be justified by changes in technique or conditions of work. However, no uniform national wage scale was laid down: all piece and time rates were fixed locally. It was not until 1928 that a national scale of piece rates was established for melters (the famous ' Brown Book '); but the agreement of that year did not cover the ancillary workers (who are still paid on a great variety of systems ranging from ' pure ' piecework through many combinations of timework and piecework), nor the labourers (who are usually paid on ' pure ' timework). The *levels* of rates for these ancillary workers are still not prescribed by national agreement (though *changes* in rates are); and the systems on which they are paid are determined by the policies of firms and depend on local bargaining.[2]

The several important national agreements since 1928 have not resulted in any significant narrowing of differentials. In 1940 the sliding scale—which had become meaningless because of the wartime control of steel prices—was frozen at 67½ per cent, and a cost-of-living bonus was adopted. Although this bonus, which was the first national flat-rate increment in the history of the industry, can only slightly have narrowed percentage wage relationships, an expressed purpose of raising the sliding-scale percentage to 75 per cent in 1951 was—in the words of the agreement—to ' restore differentials '. Another provision which tended to maintain, or widen, percentage differentials was the introduction—under the 1947 agreement on continuous working and the 48-hour week—of extra shift payments to be calculated in proportion to existing earnings.

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[1] Since the sliding scale provided for *percentage* changes, it tended to main wage relativities.

[2] For instance, the firm states that it prefers a system of paying a worker about half by time and half by piece, and that it likes the piece payment to be based on the smallest group whose output can be measured. Although there are plenty of exceptions all over the firm, in the newly-established sections payment systems for particular jobs may be altered so as to accord with this policy. Naturally, however, any divergence between changes in productivity and in time rates will upset any preferred ratio.

It may be argued that the method of paying steel melters—almost exclusively by tonnage—is not primarily intended to affect differentials in any way and that it is merely an incentive system like any other. Indeed, this incentive system is very possibly more effective for melters than for many other melting-shop workers, if only because payment is related to the efforts of a small group.[1] There is certainly competition between melting teams, and co-operation within the team is very important. But even first-hand melters, whose position of authority has been least affected by technological change, no longer have their previous control over output: they do not, for instance, determine when their furnaces shall be tapped. In any case it is not the melter's control over output which explains his wage advantage. His superiority is rooted in history; once established, it was never seriously challenged.[2] The Brown Book of 1928 has, until recently,[3] been sacred. In it there are laid down national scales of rates per ton that are independent of everything but the type of steel and the size and type of furnace. Although these rates are regressive, in that they diminish both as the capacity of furnaces increases and as the output from particular furnaces rises, they have not been sufficiently regressive to prevent the melter being a main beneficiary from the considerable technical advances of the past thirty years. He has accomplished this without—to say the least—any very obvious increase in his skill.

The melting shops are not alone in these respects. In the mills, where rates are not regressive, skilled wages have ' run away ' even more, while job content has been very much simplified. But in the blast furnaces the case is different. Blast-furnace keepers have in the past been regarded as less skilled than other skilled process workers, and their wages have always been lower. But they have fallen further behind; by 1951, they had benefited little from technical advance. For whereas in the mills and melting shops technical progress has tended to be piecemeal, in the blast furnaces equipment has been scrapped and replaced wholesale—and this made it possible to revise piece rates so as to prevent the runaway in wages which had taken place elsewhere. Moreover, tonnage payments formed a relatively far smaller proportion of keepers' earnings. The position in 1950–1 was that blast furnace keepers were earning, on average, £9.18 a week while first-hand melters earned £18.3 and rollers (in the mills) £25.14. Coggers in the mills, whose time rate was very little above that of blast furnace keepers, were getting tonnage payments two or three times as great. Keepers' average earnings, in fact, were little higher than those of the semi-skilled—which was very different from wage relativities in the other departments.

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[1] Most ancillary workers, on the other hand, are paid tonnage rates based on melting-shop output as a whole. However, as there are two melting shops at this plant and these were set up at different times, the basis of estimating tonnage payments for ancillary workers differs in each.

[2] As Turner observes (*op. cit.*, p. 261), promotion by seniority 'automatically forestalls the danger to the better-paid of 'undercutting' by men not qualified by the conventions of the trade, since the number of the latter is automatically regulated by that of the skilled.'

[3] In 1957, negotiations were in progress for a revision of some of the tonnage rates. Very possibly, one of results will be to increase the rates for basic steel produced in tilting furnaces (as at Appleby-Frodingham), since melters on other types of furnace have done even better.

However, since this study was made, there have been great changes at Appleby-Frodingham—the most important in this context being the development of revolutionary techniques of ore preparation. Output from individual blast furnaces has been more than doubled, and as a result the earnings of blastfurnacemen—particularly of the skilled keepers—have risen steeply, again for reasons unconnected either with skill or effort. In the same period, the first-hand melters have lost some of their advantage over other melting-shop workers. The melting shops have been extended by the addition of furnaces, and those whose tonnage bonuses are based on shop output have gained in relation to those whose bonuses are based on furnace output—in so far as it has been possible not to increase the number of ancillary workers in the shops. The paragraphs that follow should be read in the light of this comment.

Historically, there have been three main groups of workers in the melting shops: the first hands, the rest of the melting team (second, third, and sometimes fourth hands), and the ancillary workers (*e.g.* teemers, mixers, ladlemen). In addition, there are of course the labourers—who are not on any promotion ladder—and a few other unskilled workers who are; but we propose to confine the present discussion to the skilled and semi-skilled. Before we examine the wage relationships of these workers, however, there is one feature of the melters' working arrangements which must be explained. For certain weeks during the year each melting furnace is out of operation because it has to be relined. At these times the team affected is disorganised; they may work short time, ' borrow ' other furnaces for part of the time, or bye-turn for absent melters or others. While only melters are directly affected, their wage relationships with other workers will obviously be distorted. From the evidence of the clock cards it was not always easy to distinguish these ' re-lining ' weeks from weeks when short time was being worked for other reasons; so that we shall first exclude all short time, and then consider earnings in ' normal ' weeks as a whole.

Diagram VII shows the distributions of earnings (in standard and overtime weeks only) for skilled and semi-skilled workers in the melting shops, the melters—in the skilled group, the first hands—being represented by shaded blocks. Both in the skilled and in the semi-skilled distribution, the mean of melters' earnings is 45 per cent higher than that for the other workers in the group—an *intra*-skill differential at least twice as wide as that even between skilled and unskilled in most industries. The skilled group as a whole earned, on average, 63 per cent more than the semi-skilled; but first-hand melters earned more than twice as much as the semi-skilled ancillary workers. Again, the second-hand melters (who were than rated as semi-skilled)[1] all earned more than any skilled ancillary workers except teemers.

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[1] The year after our data were collected, second-hand melters were ' promoted ' to the firm's skilled grade, thus disposing of the *rationale* by which the grade had been restricted to the tops of promotion ladders.

Diagram VII

Distributions of Weekly Earnings in Melting Shops

(short-time weeks excluded)

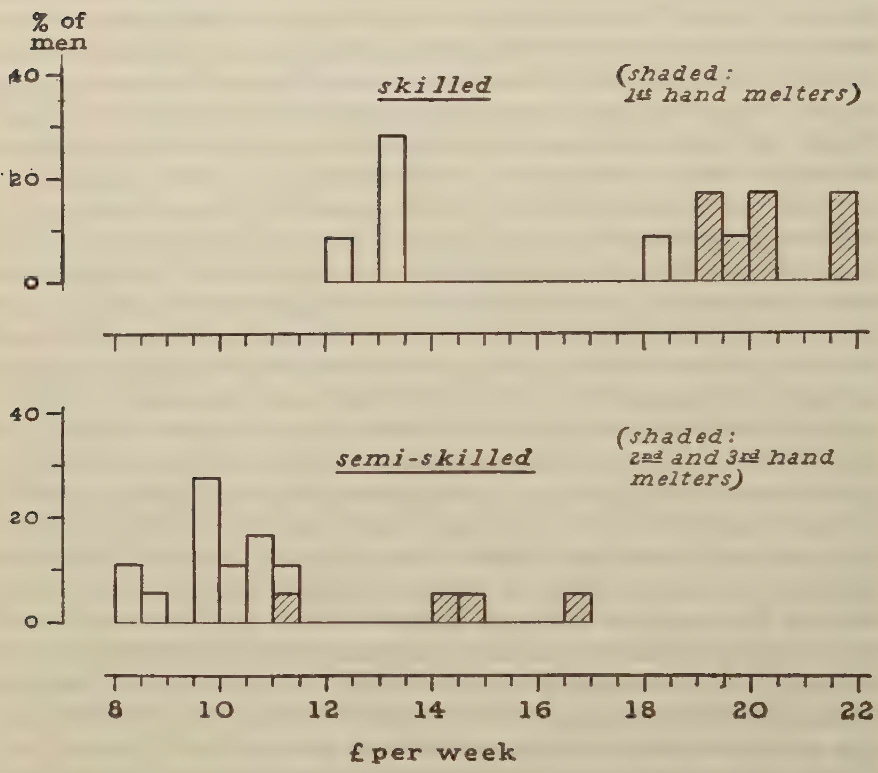

TABLE XIX

Steel Melters' Differentials

Categories	*Percentage by which melters' average earnings exceeded those of other workers in normal weeks*			
	—excluding short-time weeks		—*not* excluding short-time weeks	
	weekly earnings	*effective shift rates*	*weekly earnings*	*effective shift rates*
First-hand melters over other *skilled* workers	45	43	32	42
Second- and third-hand melters over other *semi-skilled* workers	45	45	39	44

These rather startling relationships were not in any way the product of differences in hours worked or of the timing of the rota; for the distributions of effective shift rates for the same weeks were so similar that it is not worth while reproducing them here.

When we consider weekly earnings in *all* normal weeks—*i.e.* take into account the effect of the ' re-lining ' weeks mentioned above—the only substantial change in the distributions is that the melters lose ground in each case: the differential of first-hand melters over other skilled workers narrowing from 43 to 32 per cent, and of second- and third-hand melters over other semi-skilled workers from 45 to 39 per cent. However, the corresponding differentials in effective shift rates for all normal weeks are much the same as they were when the short weeks were left out of account. All these relationships are summarised in Table XIX. The biggest disparity is that in the weekly earnings for first-hand melters *vis-à-vis* those of other skilled workers in ' all normal weeks ' as against standard and overtime weeks only. The implication seems to be that first-hand melters, when their own jobs close down, prefer to go absent rather than to bye-turn at other jobs. This might be a matter of status; or again, the need of older men for cash may sometimes be less pressing than their juniors'. But tax rates on these marginal earnings might in any case leave them so little extra that they would be buying their occasional leisure cheap.

The differential enjoyed by melters over other workers is, of course, not the only differential in the melting shops. But the others are all much smaller; and they are difficult to separate out clearly, because of the variation in the principles governing premium payments. This variation would be wearisome to set out in detail, and its total effect is in any case not great: it is fair to say that the only substantial differential is that of the melters.

(c) *Summary of differences between Production and Craft Sectors in respect of the composition of differentials*

Now that we have examined some of the differences between Production and Craft workers in respect of the concept of skill, as well as of the peculiarities of work arrangement and wage payment in each, we are in a position to attempt to show the net effect of these differences and peculiarities by means of a brief comparison of the *composition* of the skilled-unskilled differential in each. In other words, we can now ask the following questions in respect of each sector: (*a*) how much of the difference in earnings was due, on average, to the skilled having higher effective rates of pay? (*b*) how much was due to this difference being offset by the unskilled working longer hours? and (*c*) how much was due to the latter consequently earning higher premia? Table XX gives some indication of the contributions made respectively by (*a*), (*b*) and (*c*) to the differences between the average earnings of skilled and unskilled workers in Production and in the maintenance department.

For practical reasons, the data relate to week I only, and on the Craft side

TABLE XX

Estimated Composition of Differentials in Production Sector and Maintenance Department (Week I only)

Sector or Department	*Total sum by which average weekly earnings of skilled workers exceeded those of unskilled*	—*of which:* (*a*) *estimated as due to differences in effective rates of pay*	(*b*) *estimated as due to differences in hours worked*	(*c*) *estimated as due to difference in 'gift' or premium hours*
Production sector ...	115/10	+152/3	−30/–	−6/5
Maintenance department	37/6	+42/–	−2/10	−1/8

cover only one department (albeit the biggest).[1] Moreover, it is true that some degree of arbitrariness is implicit in committing oneself to any one procedure for this sort of calculation, and the figures in the table should therefore be taken only as indicating rough orders of magnitude. But, when all this has been said, the contrasts between Production and Craft are so marked, and so strikingly reinforce what has been said above, that they are undoubtedly worth stressing. Thus unskilled Production workers were earning 60 per cent of the weekly wage of the skilled, the 40-per-cent differential being accounted for as follows: a 52-per-cent superiority of the skilled in effective hourly rates was offset to the extent of 10 per cent by the unskilled working longer hours, and by another 2 per cent in respect of their premium earnings. In the maintenance department, on the other hand, the unskilled were earning 81 per cent of the skilled wages; and the differential of 19 per cent represents a 21-per-cent superiority in skilled rates offset by 1 per cent because of the longer hours of the unskilled, and by another 1 per cent in respect of their premium earnings. Thus in Production, the skilled workers' overwhelming advantage in rates was whittled down to some extent by the very long hours worked by the unskilled (though little by premium payments); the skilled Craft workers had a much smaller lead in rates of pay which, however, the unskilled diminished very little either by working longer hours or by their premium earnings.

(d) *Week-to-week variability in earnings*

The above examination of wage relationships has been conducted in terms of the average earnings of groups, or of distributions of the average earnings of individuals, for all normal working weeks in the year. But there is one very important aspect of wage payment—which is almost always neglected, and which our manner of presenting the data has in fact concealed. In some industries, no doubt, there is either little variability from one week to another, or what variations there are fully predictable. In steel, however, these variations can be very large indeed (the range of an individual's earnings over normal weeks being sometimes up to two or three times his weekly average over the year); nor can these fluctuations by any means always be forecast. While we propose to devote a separate study to this question, its relevance to an examination of differentials cannot be overlooked in the meantime.

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[1] The requisite data were not available for all normal weeks; and, owing to the complexities of payment, there seemed very little to be gained by recasting the data for the other Craft departments into the form required.

Obviously, if the earnings of individuals fluctuate greatly from week to week, a worker whose average earnings are low may, in some weeks, earn more than one whose average earnings are considerably higher. This can be important for differentials. If a worker can confidently rely only on a low wage (even though he may obtain a high one in certain weeks), he may be inclined to base his pattern of expenditure on his ' minimum expected ' rather than on his average earning; and thus no study of differentials should be confined merely to relations between averages. This point is illustrated in Table XXI. It is not, of course possible to identify such a concept as men's ' minimum expected ' earnings simply from a study of their pay-packets; but if we take a very crude indicator of this such as the lower decile of the distribution of individuals' earnings,[1] we can see that there is *prima facie* evidence that the average is decidedly not an adequate description of the differential in two of the Production departments at any rate. Both in the blast furnaces and in the melting shops, unskilled workers' ' minimum expected ' earnings were fully 20 to 25 per cent lower than those of semi-skilled men, even though their average earnings were only 10 to 15 per cent lower. No such effect was apparent in the section mills (nor, for that matter, did it appear in Craft departments); for the plate mills, surprisingly, the differential based on the deciles is the smaller. But, where earnings are variable, differences between workers in the shape of their earnings distributions are unquestionably relevant to any realistic study of wage relationships.

TABLE XXI

Percentage Wage Relationships based on Lower Deciles and Means of the Distributions of the Weekly Earnings of Individuals

Department	*Unskilled as percentage of semi-skilled:*	
	lower deciles	means
Blast furnaces	79	90
Melting shops	74	86
Section mills	86	87
Plate mills	84	80

IV. CONCLUSIONS

In earlier BULLETIN articles, we have been concerned mainly with wage differentials, and it is largely for the sake of continuity that this has been selected as the opening topic of the present enquiry into wages in a single large firm. The choice of subject has so far been determined to some extent by the type of material available to us. Hitherto our information has related, at best, to average levels of wages and hours of work for timeworkers and pieceworkers in selected occupations in different districts, sections of industry, and firms, the data referring to single specimen weeks in particular years. This kind of material, which is admittedly much more informative than the all-embracing industry-wide averages published officially, has made it possible to do two things: firstly to study the extent to which relative earnings levels conformed, or failed to conform, with established differentials in wage rates (*i.e.* with the relationships prescribed or implied by the relevant collective agreements), and secondly to examine how far the observed relationships might be accounted for by economic and other pressures. Much of the latter discussion was necessarily speculative. Overall differences in grouped data provide an insecure basis for confident analysis; for, unless it is known how a difference is composed, it is perilous to claim to explain why it exists. Thus for several years we have strongly desired to get behind the averages and to examine wage differentials as they really arise.

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[1] It should be noted that the distributions referred to here are different from those used earlier in the present article. There, it was the *averages of each worker's earnings in* normal weeks that were distributed; here, it is *each worker's earnings in each of his normal weeks.*

Inevitably, any attempt of this kind has to be conducted in a single firm; and every single firm is a little world of its own. But we have chosen a steel firm, and a steel firm is a peculiar form of microcosm; for it contains within itself a far wider range of practices than are usually found in single firms. This is particularly true of two features which we have analysed in this article—systems of payment, and patterns of working-times. In most engineering firms, for example, most workers will be paid according to a single set of national agreements specifying minimum rates for the main occupations and laying down uniform premia for overtime working. The firm's system of wage payment may be simple (as where there is a plain hierarchy of time rates by occupations) or it may be complex (as where a list of piecework prices has been built up from detailed time-studies taken over a long period of years); but, whichever it is, it is likely at least to be internally consistent, and any worker who understands how his own paypacket has been calculated will probably find little difficulty in understanding how it has been done for others.[1] Certainly this is not true of a steel firm; there are two radically different types of collective agreements, one based on the hour as a unit of work, and one on the shift. This is not a purely pedantic distinction, and unless it is grasped it is very difficult to comprehend why the premia for shift and overtime working should be so completely different for Production and Craft workers. The distinction reflects the fact that the agreements covering Production workers are the product of bargaining between groups whose sole interest lies in the steel industry, in which shift-working is the rule, while those covering Craft workers are inevitably coloured by the habits and practices of the engineering and building industries, where the main interests of the unions concerned are to be found.

The second peculiarity of a steel firm is of course that it works continuously. Consequently, premium payments assume a much greater importance than in most firms. Continuous working does not mean that all workers work a shift system including nights and weekends; the mills, for instance, only produce during the week, and there are many jobs—particularly for labourers and maintenance workers—which can be done mainly during the normal working week. As a result, the patterns of work range from the *fully*-continuous through the *weekday*-continuous and the double-day shift rotas, to straightforward daywork. Naturally, because part of the works is functioning over the weekend, weekend work is common even for dayworkers. All these differences in working patterns must lead to differentials; but, as the size of the differentials will depend on the premia established by two different sets of national agreements, wage relationships arise which in another industry would only occur, if at all, between firms.

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[1] However, some of the simplicity in our own studies of engineering wages arose from the fact that maintenance workers were excluded from the scope of the employers' figures.

The complexities are by no means solely due to differences between national agreements. For a variety of historical reasons, the systems of payment on the Production side (and also for some at least of the Craft workers, such as bricklayers) present a bewildering pattern—or lack of pattern. In our studies of engineering wages, we had figures for two groups in each occupation —timeworkers and payment-by-results workers. Of course, the latter were no homogeneous group; but it must be doubted whether they were quite as diverse as the payment-by-results workers in this firm, where the piecework or tonnage element in pay ranges from 8 to 85 per cent, and where, moreover, many workers change from one system to another in the course of a single week. To some extent the variety of payment systems is due to the existence of four main—and very different—Production departments; in some sense therefore we are studying four firms rather than one. But, over and above this, there can be little doubt that the wages structure of a steel firm is about as complicated as it could be, and it is certainly hard to rationalise the existing pattern of earnings on economic grounds[1]—for example, of responsiveness to market pressures. On the contrary, it would appear that the historical advantages of certain privileged groups of workers—paid largely by tonnage —have been reinforced over the years with little reference to changes in relative skill requirements. These workers are exceptional in that, despite the flat-rate increases awarded at national level, they have managed in the main to stand aside from the general trend towards equality in wages.

This is more than a historical accident. Another group who have to some extent also stood aside are the coal-hewers, who share with steel melters and rollers three important characteristics. Firstly, they are both paid largely by the piece. Secondly, while both groups are skilled, neither derives its skill from apprenticeship: in both industries the way to the top is through promotion-by-seniority. Thirdly, both groups belong to industrial and not to craft unions, and indeed because of their seniority may be the real controllers of union policy. This latter point should not be pressed too far; for contrary examples could be cited. But there can be little doubt that the wide differentials enjoyed by these two groups could hardly have been maintained but for the seniority rules. After all, a melter's or a coal-hewer's differential is not, like that of a craftsman, achieved early in life: he has to begin at the bottom and will only reach the top towards the end of his working life. Even an egalitarian society could afford to overlook differentials based so largely on age. Economically, such seniority differentials serve a rather different purpose from that of the craftsman's differential: they are not so much rewards to the skilled as incentives to the unskilled, and it may well be that they are indeed a cheaper incentive than more generous piecework payments at a lower level. They are certainly an effective incentive to the labourer; for, in explaining his very long hours of work, one cannot discount his desire to ' earn ' his place on the promotion ladder—even if his immediate motive is predominantly financial. How far the labourer's incentive depends on the extreme differential is another question; for, as we have seen, it is not just long hours that distinguish the labourer's work-pattern from others'. He may be doing a great variety of jobs at irregular hours and at widely different rates of pay; and the first step on the promotion ladder is thus not only a step towards the top but is also of considerable value in itself. For, although on promotion he may not necessarily receive more pay at every step, he will get higher status, more security, more regularity, and almost certainly shorter hours. Such gains will be valued differently by different individuals; but their undoubted worth is fundamentally the main reason why one distrusts measures of differentials based on averages alone and why one studies those based on the lower deciles as well. Certainly, in two departments of the firm the average measures understated the full economic inferiority of unskilled workers.[1]

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[1] In North America, where the industry is covered by a single union, a thoroughgoing programme of rationalisation (initiated by the union) has resulted in an effective simplification of the wage structure not only of individual firms but of whole regions.

One paradox about the wide skill differentials in Production is that the real differences in skill have probably narrowed over the years more than they have in Craft. Where the system is one of training on the job and promotion by seniority, there is on the surface less economic need for wide differentials; it is rather in Craft occupations, where skill normally involves apprenticeship, that the maintenance of differentials would seem to be required. In the engineering industry itself, the narrowing of the skill differential in time rates has been largely offset by the greater ease with which the skilled fitter on production has been able to earn well above his minimum. On the Craft side of steel, there is no such compensating effect; and the percentage relationship prescribed by the time rates is repeated in average earnings. This may well be because maintenance work is *par excellence* timework; and, very possibly, the same pattern would be found characteristic of maintenance workers in general.

The skill differential is by no means the only—or even the largest—differential between Craft workers. We have analysed in some detail the shiftwork differential, which in this industry is considerable and possibly excessive. Certainly, there was no such wide differential in Production, and indeed it might be thought that in a shiftworking industry and in a predominantly shiftworking town it would be daywork with overtime that would be the more unpopular. Since 1951, however, a number of changes in the premium rates and standard working weeks of Production workers have weakened the contrast between the two sectors. Moreover, the firm has told us that, except in the departments where opportunities for weekend overtime are limited, there is some difficulty in persuading craftsmen to work shifts. Craftsmen, after all, can always walk out and take their skill elsewhere. Thus it appears that, as far as our period is concerned, it was the shift differential in Production that was inadequate, not the shift differential in Craft that was excessive. But it remains true that so wide a shift differential must tend to make nonsense of the pennies and twopences that differentiate the hierarchy of skilled rates—as well as swamping many inter-skill differences. Even though a fitter's rate was nearly a third higher than a labourer's, a fitter on daywork was receiving less per hour than a labourer on continuous shiftwork; and thus although, on the average for all Craft workers, the rates differential was maintained in earnings, there were many cases where skill was receiving no perceptible reward.

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[1] An overstatement is of course quite possible. It could, for instance, arise in a firm where labourers worked a regular number of hours each week at time rates, while semi-skilled pieceworkers had varying opportunities of enhancing their pay—as very possibly happens in engineering.

One must be careful in assessing the other ' minor ' differential for Craft workers—that for pieceworkers and taskworkers. Broadly speaking, the crafts involved in these jobs[1] were different from those of timeworkers, as those paid by results were mostly constructional engineers—platers, welders, erectors, etc.—and the differential was therefore an inter-occupational one. But it was certainly large enough for it to be easy for the semi-skilled, and possible for the unskilled, workers in these jobs to earn more than the skilled maintenance fitter—which again provides *prima facie* evidence that the rates differential was failing to do its classical job of providing an incentive to acquire skill.

But it would be ingenuous to expect to find within a single firm—especially in one with so great a complexity of jobs and working arrangements—any clear-cut example of a differential fulfilling a single specific purpose. While complexity obviously creates a need for many differential payments as between one worker and another, it is difficult to avoid an impression of arbitrariness in the particular differences that come in for substantial reward. The reasons for much of the seeming arbitrariness are not hard to find. National agreements are the products, not of bargains between workers and management in a single firm, but of large groups whose interests transcend the bounds even of whole industries. Not only are practices imposed which are not necessarily suitable to particular firms, but the very nature of national bargains tends to involve the freezing of matters which are not actively under negotiation. This leads to the perpetuation of differences which may once have had an economic *rationale* (such as the high rewards to skilled Production workers) but for which it is difficult to find any current justification. Of course, the persistence of anomalies is to some extent inherent in the institutionalisation of wages; and, as the main purpose of national agreements is to maintain industrial peace, there is a valid case for letting sleeping dogs lie. Criticism on the score of abstract justice is therefore often beside the point; it is only when the injustices are of the kind that are *felt* by workers that the question of justice becomes pressing. A more relevant criterion is the pragmatic one, whether wage differentials do in fact perform what is expected of them. It is tempting for an outsider, confronted with a bewildering variety of wage relationships, to fall back on the comforting belief that this variety must somehow reflect the infinitely subtle interplay of market pressures. What we have called the ' minor ' differentials certainly seem unrelated to market forces. Even if they—and the other anomalies we have mentioned—might be defended as giving some needed flexibility to management in the apportionment of rewards, they do so at a definite cost. Firstly, they undoubtedly increase the load on the wages office; secondly, just because they can be at best, only an indirect way of rewarding merit, they are likely to be arbitrary and therefore inefficient; and thirdly, they involve in the earnings of many individuals a high variability, which may obviously have undesirable social repercussions.

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[1] One particular craft, bricklaying (not analysed in this study), received immense piecework differentials. In this case, however, there was a special justification, as the high piecework payments were received for furnace re-lining—a job of great urgency.

It could be objected that the ultimate pragmatic sanction of the system stands; the steel industry as a whole has been remarkably free from industrial strife. But this may, in the main, be a tribute to the good sense of those involved—and to the high levels of wages which this capital-intensive industry has been able to pay. And it is certainly legitimate, particularly in the light of one recent dispute, to be concerned that differentials established for skill are being so much overlaid for Craft workers—especially when skilled Production workers (admittedly under very different conditions) retain their exceptional advantages relatively unimpaired. Indeed, the very wage relationships over which employers and unions have professed so much concern in recent years are being swamped by differential payments of lesser importance. What the study shows is not that differentials for skill are in themselves either too small or too large, but that they can hardly be expected to fulfil their presumed functions unless attention is given to the operation of those clauses of national agreements (and of local ' custom and practice ') that appear wholly unconnected with the relation of skilled to unskilled wages.

APPENDIX

The Sample

The sample consists of 470 workers, employed during the income-tax year 1950–51. It was drawn by the firm according to detailed instructions from the Institute of Statistics. Each of the three skill grades, in each department, was sampled separately—the numbers taken in each department being fixed so as to give, as far as possible, an equally good picture of earnings by skill within every department (or group of departments). In each case, rather more workers were included initially than were finally taken. Since the firm had, for its own purposes, carried out an earnings survey which showed for each skill grade in each department the distribution of annual earnings by £50 or £100 ranges, it seemed best to adjust the sample so as to conform—as closely as a small sample could—with these distributions.

The skill grading presented special difficulty, since promotion was occurring in all Production departments—particularly in the blast furnaces and the coke ovens, which were expanding fast. Workers promoted in the course of the year were allotted to the skill grades in which the firm included them in drawing up its earnings survey. Generally speaking, the firm graded them according to their occupations at the beginning of the year, although in the two departments just mentioned (where this would clearly have been unrealistic) they classified them according to the occupations in which they had mainly been working. In the blast furnaces this adjustment worked straightforwardly enough, but in the coke ovens—where something like half the workers were promoted from unskilled to semi-skilled (a distinction which is nebulous here in any case)—it proved impossible, even after studying all the available material, to arrive at any classification by skill. (As will have been noted, this department has been omitted from consideration in the present article).

The sample was drawn at random from the income-tax cards, which include details of age and length of service as well as giving the worker's earnings in each week of the year (in certain departments, the number of shifts paid is also given). For each worker in the sample, clock cards for two weeks were also asked for; these cards show the actual hours worked each day, and give details of the make-up of the worker's earnings. Where a man was actually at work in the two weeks ending May 13th, 1950 (' week I ') and March 10th, 1951 (' week II '), these were the weeks selected; otherwise, other weeks had to be chosen. These clock cards served two purposes. Firstly, they revealed something of the type of work and system of payment of the individual; in most, though not in all, cases these were characteristic of his work and payment throughout the year. Secondly, they provided two samples of weekly earnings over the works as a whole, and could therefore be used to yield representative information about the detailed composition of earnings for different types of worker. The accuracy of any results based on these samples is naturally less than those based on the income-tax card material, as there was no way of ensuring that the samples conformed with annual earnings distribution; but it is nevertheless greater than would be achieved by a pure random sample, because of the probable link with the distribution. In addition, for a limited number of selected individuals, clock cards for all weeks in the year were used to get a more detailed picture of the work-and-payment systems of particular groups of workers (such as the blast–furnace labourers).

PRICE STABILITY IN THE UNITED KINGDOM[1]

By C. R. Ross

INTRODUCTION

Since 1946, the general price level in the United Kingdom has risen by something like 60 per cent, or between 4 and 5 per cent per annum on average. It is fairly well recognised that a continued increase of prices on this scale is undesirable. It has already led to much social strain, to a widespread sense of insecurity, and to considerable hardship for particular sections of the community; and it is liable to have serious consequences for our international balance of payments. At the same time, the United Kingdom has maintained a high level of employment, an almost uninterrupted expansion of production, and the majority of people have enjoyed considerable increases in living standards. This paper discusses some of the main problems which will have to be solved if we are to combine the benefits of economic expansion with a better degree of price stability.

These are questions which involve judgments, not merely about the facts of the economic situation and the course of economic developments, but also about questions of acute political controversy. Over the years, different individuals and groups have formed and stated publicly very different judgments about the facts of the situation, and the political and economic conclusions to be drawn from them; so that it is unlikely to be easy, at any time, to put forward a view about the problem of incomes and prices which will readily command general public agreement, still less be accepted as a basis for concerted action by those concerned. The fact that, during recent months, the public has become acutely sensitive to the problem of rising prices, and that the Government has taken highly controversial action in this field (the full effects of which will not be seen for some time) makes any discussion of these questions at the present time more difficult still.

Nevertheless, the extent of public concern, and the general demand for a solution to these problems, means that anything that the Council is able to say will command an audience, even if what it has to say is likely to provoke controversy. In these circumstances, I suggest that it should be the Council's task to make plain:

(i) That this is not a question of finding a simple ' cure ' for rising prices. On the contrary, with existing attitudes and institutions, the reconciliation of price stability with a high level of employment is an intractable long-run problem.

(ii) A better degree of price stability can only be achieved if costs can be kept more stable; and this will only be possible if money incomes can be prevented from rising faster than productivity. There is no automatic mechanism that can ensure this.

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[1] This paper was originally written for the Council on Prices, Productivity and Incomes, and was submitted to the Council in November 1957. It is reprinted here in the form it was originally submitted, with a few very minor corrections.

(iii) With recent trends in productivity, the rate of increase in total money incomes consistent with cost and price stability is about 2½ per cent per annum.

(iv) To attempt to restrain the rate of increase in money incomes by a policy of reducing the level of demand (by monetary measures or fiscal policy or by other means), must involve increasing the amount of unemployment. To succeed, such a policy would certainly require more unemployment than has existed since 1945; how much more we do not know. But there is a serious risk that the reduction in demand and employment necessary to achieve price stability would have to be sufficiently great to cause serious and undesirable repercussions on our whole economic progress in the longer term.

This paper is in three parts:

Part I analyses the factors affecting prices, incomes and productivity in relation to the objectives of economic policy.

Part II examines the factors which have caused the increase in prices since 1945, and discusses some of the lessons which may be drawn from this experience.

Part III discusses some of the difficulties which will have to be met if we are to achieve a better degree of price stability in future, without seriously weakening the success of policy in other directions.

I. The Dilemma of Price Stability in an Expanding Economy

At least since the White Paper on Employment Policy of 1944, it has been the accepted objective of Government economic policy to achieve and maintain a proper balance between total supply and demand in the economic system. This objective is probably most often thought of in terms of securing 'a high and stable level of employment'; and, in view of the very high level of employment which has been maintained since the war (and the importance which has been attached to it), quite small increases in unemployment are likely to be a cause of serious public and political concern. However, it is difficult to define ' full employment ' very exactly, and a ' proper balance ' between supply and demand cannot be assessed simply in terms of a particular unemployment percentage, the stability of prices, or any other single indicator. The effectiveness of Government policy must be discussed in terms of the level of employment, the rate of growth of production and productivity, and the stability of prices; and there is no reason why a high level of employment, a satisfactory growth of production, and a stable price level should be capable of achievement at one and the same time. With present institutions, they may prove impossible to reconcile. Thus, there is no simple unambiguous barometer of economic equilibrium, but rather a whole set of indicators, which may not all indicate the same thing at any one time, and which have to be looked at in relation to the economic situation as a whole, and in the light of the different and possibly conflicting objectives of Government policy.

The balance between supply and demand which is relevant to employment and production is a physical balance—between consumers' demand for goods and services, business demand for investment in capital goods, the demands of public authorities' expenditure, and the foreign demand for our exports on the one hand; and, on the other, the physical ability of the available labour force and productive capacity to meet these demands. Widespread overtime working, a significant excess of the number of unfilled vacancies over the number of unemployed available to fill them, evidence that industry is working to the limits of its physical productive capacity, lengthening order books, waiting lists, shortages, signs that physical shortages are being met by depletion of stocks or abnormally large increases in imports: all these are possible symptoms of a situation in which total demand is in excess of the productive capacity available to meet it. Most of these symptoms—in one form or another—were apparent in the years immediately after the war, during the acceleration of the Defence Programme in 1951, and, to a lesser extent, in 1955. During these periods, the need for economic policy to reduce the pressure of demand in the economy was generally recognised (though the desirability and effectiveness of the particular methods used by the Governments concerned to control the level of demand were, of course, matters of dispute).

Similarly, a significant excess of the number of unemployed over the number of unfilled vacancies, a stationary or falling level of production, under-utilisation of factory capacity, short-time working, evidence that manufacturers are working off old orders faster than new orders are coming in, signs that stocks are accumulating because goods cannot be sold, are all indications that the level of demand is insufficient to keep the economy adequately employed. (Most of these symptoms were apparent in 1952–3, and, in consequence, the 1953 Budget was designed to increase the level of demand by reducing taxation. Again, while the specific tax concessions made were controversial, the general diagnosis that steps should be taken to expand the level of demand was, on the whole, generally agreed.)

But, while the physical symptoms of an excess or deficiency of demand can be described and identified, it is perfectly possible for prices to be rising even when there are no physical symptoms of disequilibrium. In fact, it is quite possible to have rising prices at a time when the physical indicators suggest that the economy is working significantly below optimum capacity.

Even if the level of demand is not excessive, there is always the possibility that prices may rise because of increases in costs. In an economy where wages and salaries are determined by collective bargaining between employers and trade unions, there is no automatic mechanism which will make the average rate of increases in incomes agreed upon in wage negotiations, or fixed by wages boards, or Arbitration Tribunals, equal to the average rate of increase in the economy's productivity. And if money incomes rise faster than productivity, over the economy as a whole, this will lead to increases in costs, and the rise in costs will be reflected in a rising price level.

In analysing the factors influencing prices, it is therefore important to distinguish between the effects of changes in demand, and the effects of changes in costs. The importance of the distinction can be most readily appreciated by distinguishing also two kinds of commodities: those which are sold on fairly well organised markets, such as the produce exchanges and the London metal markets, where prices are determined by the volume of goods offered for sale in relation to the level of demand coming forward; and the very wide range of goods and services—most manufactured goods, railway and bus travel, most building work, and a wide range of personal services—where sales are made on the basis of price quoted by the seller. The large majority of British goods and services fall into the latter class.

In the case of goods and services sold on organised markets, changes in demand in relation to available supplies are likely to affect prices fairly quickly, through the ordinary working of the market. If demand exceeds supply, prices will be bid up, and the profits of sellers and producers will rise (both in absolute amount, and in relation to costs and turnover). If, on the other hand, available supplies are increasing faster than the demand for them, there will be an obverse process of falling prices and falling profits In these well organised markets, excess demand can clearly force up prices very easily.

But when prices are not determined by the market, but are quoted by the seller, the forces at work are more complicated. If producers are unable, either because their physical capacity is fully employed or because they cannot get this additional labour, to meet an increase in demand, the immediate symptoms will not be pressure on prices, but lengthening order books, waiting lists, shortages, depletions of stocks—in fact all the physical symptoms of excess demand examined above. If this kind of situation persists, sellers will have an incentive to raise their prices, because at least some of their unsatisfied customers will be willing to pay more to get the goods they are demanding; but, in practice, their willingness to quote higher prices, and the speed with which they will put prices up, will depend on their judgment of how long the state of excess demand is likely to last, how price increases will affect their goodwill in relation to their competitors, and on the conventions of the business. Similarly, if demand is insufficient to provide full employment of their capacity, sellers will have an incentive to reduce prices and profits in order to stimulate sales; but their willingness to do so will depend on their assessment of the amount they will increase their sales, and of the risks of retaliation from their competitors.

If demand and employment are fairly high there is always the possibility that some unexpected fluctuation can cause total demand to exceed the productive capacity available to meet it. The extent and speed with which this excess demand will force up prices will depend in large part on the institutional arrangements by which prices are determined. In contemporary British conditions, where most prices are not determined on sensitive, volatile markets, but are fixed by the seller, where business conventions and considerations of goodwill act as a brake on frequent variations in quoted prices, and where there is a fairly general tendency to relate price quotations to costs of production, the direct impact of excess demand on the price level is likely to be relatively slight. Thus, in contemporary conditions, the explanation of the trend in prices has to be sought in the movement of costs.

The relation between incomes, costs and prices can be illustrated most clearly by considering a very simple example. Imagine a self-contained and self-sufficient economy (so that we can neglect the problem of import prices), in which there are only two kinds of income, wages and profits. In such an economy, the value of the output of goods and services must be equal to the incomes earned in the process of production. (The prices charged by a single firm will reflect that firm's wages, profits, and the cost of materials bought from other firms. But the cost of those materials will reflect the level of wages and profits in the firms producing raw materials, and so on). From the point of view of the producer, the level of costs will be determined by the wage paid for a man-hour of labour in relation to the productivity of that man-hour of labour: in other words, on labour cost per unit of output. The price at which goods are sold will be equal to labour costs per unit of output, plus the margin of profit which the producer receives on each unit of output. If money wage rates rise faster than output per man, labour costs per unit of output will increase. If producers maintain their prices constant in the face of this increase in costs, their profits per unit of output will fall, and the purchasing power of wage earners will increase. But if, as is much more likely, firms try to prevent their profits being squeezed by the rise in wages, they will mark up their prices to match the rise in labour cost per unit of output. If any rise in prices is followed by further increases in wages, the process of cost and price increases will be permanent. Moreover, this mechanism can, in principle, operate at any level of economic activity: money incomes, costs, prices all increase at the same rate; total demand for goods and services, after allowing for price changes, is unaffected by the process, since incomes and prices change in the same proportion, so that the real forces affecting the volume of employment and production will be unchanged.

The real world of British experience is, of course, much more complicated than this artificially simple example. The prices of imported materials exert a considerable effect on our costs of production; wages and profits are not the only kind of incomes; some prices, such as house-rents, are based on other influences besides costs of production and profit margins; while indirect taxes and subsidies also effect the level of prices. But the possibility that costs and prices can go on rising without physical symptoms of excess demand is real enough. Where wages are determined by national collective bargaining there is no mechanism which can automatically prevent it.

It is sometimes suggested that a situation in which the rate of increase in wage and salary rates is faster than the rate of increase of output-per-man can only occur if there is an excess demand for labour. Such a view is unhelpful for the formulation of economic policy, unless it is accompanied by a fairly definite view of how much unemployment would be needed to achieve stability. Further, this kind of argument is based on a serious misconception of the way wages are determined, and the way the labour market works. Basic wage rates are fixed by bargaining between groups of employers and trade unions representing large groups of employees. Relative bargaining strengths, ability to pay higher wages, evidence that the industry's profits and productivity are rising faster or slower than other industries, recent trends in the cost of living, all affect the final figure arrived at. If an expanding industry, in which production, productivity and profits are rising, agrees to pay increased wages, it may be able to do so without increasing its own costs; but, even if such an industry's own costs are not increased by granting wage increases, it may well stimulate wage demands in other industries, since other trade unions will be under pressure to secure corresponding increases for their own members. The industries faced with these consequential wage demands will find it necessary to grant some increase despite the fact that to do so involves increasing labour cost per unit of output. They may be willing to agree to wage increases because of the fear that they may lose some of their labour (whether or not these fears are justified): but, even if they are not unduly worried about losing manpower, they may still accept the need to pay higher wages, either because they regard the unions' arguments about differentials between industries as important, or because they do not wish to worsen their labour relations by being the first to refuse a wage increase in a time when wage rates are generally rising, or on the grounds of cost-of-living increases. If wage rates were determined by a competitive market, and a rise in wage rates (or earnings) in one industry attracted an inflow of labour into that industry, the rapid inflow of new recruits would have the effect, in a competitive market, of moderating the initial rise in wages. But this does not happen: if wage rates are increased as a result of collective bargaining, they remain at the level determined by negotiation; even if there is a certain amount of unemployment, there is no competitive mechanism to moderate the increase.

Further, it is often suggested that the fear that increases in costs will not be able to be passed on in price increases, because higher prices will lead to a loss of sales, should be an effective brake on employers' willingness to grant wage increases. The effectiveness of this brake is greatly reduced when wage increases are negotiated industry by industry. For, by and large, the competition of which the employer is most conscious is the competition of firms in the same, or similar, line of business to himself. If he knows that his competitors' costs will be affected by wage increases in the same way as his own, the dangers of agreeing to wage increases seem smaller. Again, this is likely to be true whether or not there is any physical evidence of excess demand.

The probability that, even when the level of demand is not excessive in any normal sense, there may still be persistent pressure on costs and prices must therefore be faced. A government wishing to stop this kind of increase in incomes, costs and prices is very awkwardly placed. It can attempt to impose direct controls on prices (and, possibly, subsidise those commodities that are especially likely to provoke wage demands on cost-of-living grounds) and, when purchasing power rises, it can check the excess demand which results by increasing taxation. In time of war, or emergency, such action is probably the only way to deal with the problem. But in more normal conditions it has serious drawbacks; and if the rise in costs, which is the cause of the process, persists, price controls cannot provide a permanent answer. The only other course open to a government which wishes to maintain price stability within the present framework of collective bargaining is to try and influence the rate of increase in money incomes by reducing the level of demand in the economy. This can be done by increasing interest rates and restricting credit, by increases in taxation, or by reducing public authorities' expenditure (current and capital); and there is little doubt that if demand were sufficiently reduced, the bargaining power of the Trade Unions would be sufficiently weakened for them to demand smaller increases in money incomes, while the resulting fall in profits would make business less willing to agree to pay higher wage rates, and in conditions of falling demand employers might also feel less confident of their ability to pass on increases in costs as increases in prices. There is no doubt that a sufficient reduction in demand would achieve price stability: but how big the reduction in demand would have to be to achieve this is not a question to which economic analysis can provide any satisfactory answer. Given present attitudes and institutions, it would require more unemployment, and a larger margin of unused capacity than we have had since 1945. How much more, we do not know.

It has been suggested that stability of prices and costs can be achieved simply by controlling the quantity of money. This may be true as a long-run proposition, but it is important to be clear about the mechanics of the process by which control of the quantity of money can be expected to stop a process of rising prices, when the increase in prices is caused, not by any general excess of demand over supply, but by increases in costs. Looked at in detail, the process would be roughly as follows. If money incomes rise faster than output per head, costs will rise; and business will require more money to finance its transactions. The increased demand for money, the supply of money being restricted, will lead to a shortage of credit and an increase in interest rates. If the monetary authorities persist in holding the supply of money fixed in the face of the increase in costs and prices, interest rates will eventually rise far enough, and credit become scarce enough, to affect business decisions about the profitability of new investment, and the resulting fall in investment will lead to a contraction of demand, production and employment. This contraction would be likely to make labour more cautious in demanding, and employers more reluctant in agreeing to, increases in money wage rates. But it is only if employers react to the restriction of the money supply by greatly stiffening their attitude to wage demands while at the same time keeping up their investment plans, in the face of rising interest rates and scarcity of credit, that control of the money supply can maintain cost-price stability without reducing production and employment. In fact, this is most unlikely: the reduction in the rate of increase in wages is only likely to happen as part of a general process of contraction, in which the impact of monetary restriction will affect investment, production and employment as well as incomes and prices. And, if control of the quantity of money by itself is to keep keep money incomes rising in line with the general trend in productivity, without restricting the growth of production, the knowledge that the money supply is being controlled will have to be a sufficient threat to change people's attitudes about the rate of increase in wages which is appropriate in the longer term.

Thus, if there is a tendency for money incomes, in particular wages and salaries, to increase faster than output per head, the Government will always be faced with the difficult choice of reducing demand in order to check the rise in costs, at the risk, in the short run, of reducing production and employment, and in the longer run, weakening the forces making for long-run growth and innovation.

It is impossible to be very precise about the complex forces which determine a country's economic progress, but the fact of economic growth is clear enough. The experience of almost every industrial country shows that (save in exceptional conditions, such as times of war) the output of which an economy is capable can be expected to increase year by year, as new investment projects add to productive capacity, and improvements in technique and organisation are reflected in rising productivity. To keep total supply and demand in balance over any length of time, the level of demand must be kept expanding at a rate sufficient to match the potentialities for increasing production. The desirability of keeping demand rising to prevent industrial stagnation may well be inconsistent with the objective of price stability, if price stability is to be maintained by reducing demand.

The rate at which productive capacity can be increased is itself a direct concern of economic policy. The need to foster the expansion of productive capacity, by encouraging technical progress, increasing investment and increases in productivity, is particularly important for this country in its present circumstances. The majority of people have come to expect progressive improvements in their standard of living. There are large demands for improvements in the social services and for increases in public investment. Besides these pressures for social improvement, which can only be met out of rising production, there is the problem of our international balance of payments, and in the end, of our international power and prestige. It would be highly desirable to provide more of our resources for the development of under-developed countries (in particular, the Colonies); and if we are to make our balance of payments position less precarious, we need to increase our share of world markets. We are unlikely to maintain, let alone improve, our long-term position as an exporter of industrial products unless our rate of industrial expansion and technical progress is fast enough. In the long run, growth is quite as important as stability. To re-establish ourselves, we must need to do better than our competitors—both as regards our ability to sell exports, and in the wider context of our power to sustain an expanding and progressive economy.

The long-run importance of economic expansion raises two questions of immediate importance: first, what kind of economic policies are likely to promote economic growth; secondly, how to reconcile expansion with stability.

It is frequently argued that conditions of high demand and high employment are unfavourable to economic progress. A high level of demand means that most goods and services—even those which are produced by the least efficient firms—can find an easy market. As a result, it is claimed that the average level of industrial efficiency gets reduced; and since profits are easily earned, the pressure to increase efficiency and introduce new products is likely to be weakened. This may be so; but in most industrial countries the rate of increase in production and productivity during the past decade seems to have been significantly faster than in most previous periods, when high profits and high levels of employment were less assured.

Indeed, it is likely that any government which wishes to foster the growth of productivity and productive capacity should aim to maintain a level of demand high enough to keep productive resources fairly fully utilised, and to create the kind of conditions in which business men and their employees expect that expansion in demand will be sustained. It is only if industry can be given the confidence to plan for the more rapid expansion of productive capacity, that a more rapid rate of growth will be achieved. If a high level of employment can be maintained, management will have a strong incentive to raise productivity and save labour in order to be able to meet expanding demand. New products and new processes are most likely to be introduced if the prospect of rising demand can reduce the risks of innovation. Trade unionists will be much better able to accept the introduction of labour saving machinery, and the redundancies that are inevitable in a process of rapid economic change, if they can be confident that redundant workers will be able to find new jobs in expanding trades without too much difficulty. Restrictive practices, on both sides of industry, grew up when the level of demand was depressed, and market sharing and spreading out of work were understandable defences against the danger of increasing losses and unemployment. Some of these practices clearly reduce productivity: equally, they are unlikely to be eliminated very easily unless those concerned can be confident that if they abandon particular practices there will be sufficient opportunities open to them to make the risks worthwhile.

The importance of promoting economic growth, and the desirability of a high level of demand to provide the conditions for economic expansion, are becoming widely recognised. If it were not for the danger that a high and rising level of economic activity may be accompanied by rising prices, the need for high demand to promote long-run economic expansion would probably be fairly uncontroversial. And, in so far as increases in productivity and technical progress depend on new investment, measures designed to stabilise prices which have the effect of reducing productive investment must necessarily slow down the rate of progress.

To sum up the argument so far:

(i) The direction which economic policy should take in increasing or reducing the level of total demand in the economic system cannot be decided simply with reference to any single indicator, such as the price level or the level of employment, but in relation to the economic situation as a whole.

(ii) There is no automatic mechanism to keep the rate of increase in money incomes equal to the overall increase in productivity. As a result, there is always the possibility of persistent and self-sustaining pressure on costs and prices.

(iii) It is always possible to prevent such a process by reducing the level of demand and economic activity sufficiently; but it is uncertain how large the reduction in activity would have to be, or how long it would have to last.

(iv) There is certainly no guarantee that the level of unemployment necessary to achieve price stability is consistent with any politically acceptable definition of full employment; and there is at least a serious risk that the degree of under-employment necessary for price stability would have undesirable effects on economic growth.

II. The Lessons of Post-War Experience

The danger of persistent pressure on costs and prices in conditions of high employment is sufficiently serious, and the uncomfortable and largely self-defeating nature of the process is sufficiently evident, that it is, in a sense, surprising that it has not been generally recognised, and that no practical solution has been implemented. But it is also unlikely that an economy which started to implement a full employment policy in conditions of reasonable stability would find itself confronted with anything like the pressure on costs and prices which has been evident since 1945.

The truth is, of course, that Britain started to implement peace-time full employment policies in circumstances most unfavourable to price stability. The large disequilibrium left by the war, and the further disturbance to the world economy caused by the war in Korea, have made the achievement of anything like price stability exceedingly difficult. As a result, the problems posed both for successive Governments and Trade Union leaders have been exceptionally difficult, and the exceptional force of circumstance and pressure of events have had the effect that the problem of pressure on the price level has assumed a peculiarly intractable and controversial form. The disequilibrium left by the war, and the excess demand which went with it, has meant that many critics have attributed the increase in prices to the failure of Government policy to deal adequately with the problem of excess demand, rather than to rising costs; while some other observers have been more concerned to emphasise that much of the pressure on prices (and hence on wages and costs) was initiated by increases in import prices, which were the result of world economic conditions, and thus outside our own control. In these circumstances, it is perhaps less surprising that the public has been slow to recognise that the maintenance of cost stability is not a simple matter of ‘ controlling inflation ’, but a long-run problem inherent in any policy of full employment.

A detailed analysis of the factors underlying price movements since 1945 would be too lengthy, and too complicated, to include in a paper of this kind. In particular, a comprehensive appraisal of the relative effects of excess demand on the one hand, and rising costs (in particular rising labour costs per unit of output) on the other is an exceedingly difficult task. For a detailed statistical analysis, I would draw attention to the account in the White Paper ‘ The Economic Implications of Full Employment ’[1]; and to Mr. J. C. R. Dow’s ‘Analysis of the Generation of Price Inflation in the United Kingdom’.[2] The following paragraphs attempt to summarise what I believe to be the principal features of recent experience.

When first post-war wage settlements were negotiated, there was every sign of excess demand in the economy; but excess demand was prevented from exercising any immediate or large-scale pressure on the price level by the continuation of the war-time system of rationing, price controls, and allocation schemes. But the general shortages of food and raw materials left by the war led to a rise in world commodity prices, and to substantial increases in import prices. There were in turn reflected in increases in costs, and increases in the controlled prices of food and other consumer goods. This increase in retail prices, which followed the rise in import prices, soon led to renewed pressure for wage increases to offset the rise in the cost of living. Most of the increase in wages, costs and prices in this country in 1946 and 1947 was probably the direct result of this pressure on incomes and costs.

The danger that the process of wages and prices forcing each other up would continue soon became apparent; and early in 1948 the Government appealed for general restraint in increases in wages, salaries, dividends and other incomes. This appeal had a good measure of success, and while prices did not stop rising altogether (import prices, and consequently retail food prices, in particular, rose further), they rose very much less rapidly. The increases in wage and salary rates were much slower, and there was much less pressure on labour cost per unit of output.

This period of greater price stability, and the wage restraint which made it possible, ended with the outbreak of war in Korea.[3] Commodity prices rose sharply; import prices increased, retail prices began to rise. The rise in retail prices was too fast for voluntary wage restraint to seem a practical proposition, and substantial increases in wage rates were demanded—and granted—largely to compensate for the increase in the cost of living. The rise in costs, which resulted from the increase in money wages, led to a general increase in prices between 1950 and 1952.

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[1] Cmd. 9725, 1956.

[2] *Oxford Economic Papers*, 1956.

[3] It is difficult to assess the effects of the devaluation of sterling in September, 1949, because, before the full effects of devaluation on the British price level could be felt, they were swamped by the much larger impact of the Korean War. But prices and wages certainly rose less than many people expected in the six months following devaluation.

The breakdown of wage restraint at this time is understandable, but it is important that it should be seen in perspective. No new attempt to keep the growth of incomes in line with the growth of productivity is likely to succeed unless the background of the earlier attempt at restraint is understood. Most people thought of wage restraint as essentially a temporary measure to help the Government with its post-war economic crisis; and the shock of a 12 per cent increase in average retail prices, and a 16 per cent increase in retail food prices in twelve months[1] would have imposed a severe strain even on the most long-established and smooth-working arrangements for wage restraint. Further, the purpose of wage restraint was partly thought of (not so much by the Government, but by the public) as a means of reducing demand and expenditure: its real object—to prevent progressive increases in *costs*, and so stabilise prices—was not adequately recognised. The idea that wage restraint was part of the general policy of checking excess demand, and restraining consumption so as to get the maximum resources devoted to expanding exports and essential investment, was probably fairly widely held. In other words, it was felt that wage earners were being asked to deny themselves increases in living standards, in the interests of national recovery. Moreover, the increase in living standards in the years 1946 to 1951 was remarkably slow. Working class living standards had improved a good deal since 1939; but the national income estimates show that the volume of consumers' expenditure[2] rose by only about 10 per cent between 1946 and 1951, or less than 2 per cent per annum on average; and a good deal of this increase represented the overcoming of the obvious shortages of war-time. And, between 1947 and mid-1950, the index of retail prices rose significantly faster than the index of money wage rates:

Changes June 1947 to June 1950

Index of Retail Prices	+ 14 per cent
Index of Wage Rates (men, women and juveniles together)	+ 10 per cent
Index of Wage Rates (men)	+ 9 per cent

In these circumstances, the continuing failure to allay Trade Union suspicion of the purpose and implications of wage restraint is hardly surprising.

The experience of 1946–7 and 1950–2 shows increases in import prices increasing the cost of living, and provoking wage demands to prevent the purchasing power of wages falling. The increase in wages which this process generated was substantially faster than the rate of increase in productivity over the economy as a whole, so that labour costs per unit of output were

[1] September, 1950, to September 1951.

[2] Consumers' expenditure revalued at 1948 market prices.

forced up. Business increased its prices more or less in line with the rise in costs. This tendency seems to have been more or less independent of the existence of excess demand, as the experience of 1948 and 1949, when two years of wage restraint were associated with much greater price stability, suggests.

Experience since 1952 has been rather different. In 1952 the boom conditions created by the Korean war ended, and there was a fall in total demand: production and employment declined, but prices went on rising as the increases in costs of 1951 worked themselves through. By the end of 1952, there was fairly obvious evidence that the economy was operating below full capacity. There was considerable concern lest the fall in demand should lead to a period of stagnation, and measures were taken to increase demand, and stimulate production and investment. Between the end of 1952 and the latter part of 1954 economic activity increased, but there was little evidence that the level of demand was excessive during this period. This was also a period of greater price stability; but this was largely fortuitous. Wages and salaries still showed signs of rising faster than output per head; but the resulting increase in labour costs per unit of output was, on average, offset (for the first time since the war) by falling import prices. As a result, the underlying danger of a continuing rise in incomes leading to persistent increases in costs and prices was obscured, and the disappearance of the excess demand and the temporary fall in import prices engendered a feeling that ' inflation was under control '.

But there were other forces at work which were to cause the reappearance of the pressure of rising wages on costs and prices in an acute form. The period of wage restraint of 1948 to mid-1950 was accompanied by, and indeed made possible by, great restraint by companies in the distribution of dividends. Voluntary *ad hoc* dividend restraint could not be expected to last for ever, and with general economic conditions more stable and production rising again, 1954 saw a very rapid increase in dividends paid by public companies, and a striking increase in the Stock Exchange prices of industrial shares. The increase in dividends, and the Stock Exchange boom (though they may have been justified by trends in production and profits, and were probably an inevitable reaction to the period of dividend restraint), were sufficient to provoke Trade Union demands for higher wages.

It is true that, in 1954–5, there was evidence that the level of demand was probably excessive in relation to the labour and productive capacity available; but there is little evidence that the increase in prices, or the acceleration in wage demands of 1955, was in any useful sense, the consequence of excess demand. It is possible to argue that the pressure on wages occurred because, with demand so high, the bargaining power of the Trade Unions was very strong. But, in any condition of high employment, the potential bargaining power of the Unions will always be strong; the fact that the Unions decided to press this bargaining strength hard in 1955 is explicable in terms of the fear that the position of wage earners was deteriorating when compared with the increases in profits and property incomes indicated by the exceptionally rapid rise in dividends and the Stock Exchange boom. The fact that the tax reductions of the Budget of April 1955 were of most benefit to those with higher incomes, while the measures subsequently taken to check excess demand included such steps as the ending of the remaining subsidies on milk and bread, made it seem that one of the aims of Government policy was to alter the distribution of income to the wage-earner's disadvantage.

This kind of dissatisfaction underlies a good deal of the pressure for higher wages in the past two years. The increase in wages granted in 1955 led to increases in costs; the rise in costs has been reflected in rising prices, and these have led, in turn, to renewed wage demands. Further, it should be noted that, while unemployment has remained low during 1956 and 1957, there have been few obvious signs of excess demand in the economy since the spring of 1956. Certainly, demand has increased less rapidly than productive capacity over this period, and the increase in production since 1955 has been so slow as to cause concern. The failure of production to rise very much can only be explained by the fact that demand was held in check. (The *Economic Survey* 1957 makes this very clear.) But even though the check to demand has been sufficient to cause a good many observers to be worried about the possibility that economic expansion may be retarded, it has not been sufficient to check the pressure of wages on costs and costs on prices.

The main conclusions to be drawn from experiences since 1945 seem to be:

(i) That it is difficult to maintain price stability in an economy where changes in prices and incomes can be initiated by fluctuations in import prices.

(ii) The exceptional circumstances of the time—particularly the increases in import prices of 1946–7 and 1950–1 which provoked much of the earlier pressure for wage increases—have created an atmosphere in which there is continuing pressure for wage demands to exceed the rate of increase in productivity.

(iii) That the tendency for money incomes (in particular wages and salaries) to rise faster than output per man has persisted whether there have been symptoms of excess demand or not. Indeeed, the rise in money incomes has continued to raise costs and prices at times when the dangers of a stagnation in production and investment have been a cause for concern.

(iv) If we are to develop attitudes and institutions which will permit the stabilisation of costs and prices, while avoiding unemployment and the dangers of industrial stagnation, those concerned—in particular the Trade Unions—will have to modify their views about what is an appropriate annual rate of increase in money incomes. It is unrealistic to expect the Trade Unions to do this unless they can be assured that their present and prospective living standards will not suffer, and that other classes do not gain at their expense.

III. THE CONDITIONS FOR PRICE STABILITY

Between 1948 and 1956 national output (measured at constant 1948 prices) rose by about 28 per cent; the employed population has risen by about 7 per cent over the same period, so that the overall increase in output per person employed has been 21 per cent in eight years, or about 2½ per cent per annum. The index of weekly wage rates has risen by about 60 per cent over this period, so that labour cost per unit of output has increased 40 per cent. Statistically, this increase in labour cost per unit of output accounts for something like three-fifths of the increase in costs and prices since 1948; and it is clear that labour costs per unit of output are such an important component of total costs that it will be impossible to maintain any stability in costs and prices over a period of years unless the rate of increase in money wage rates is kept in balance with the rate of increase in output per head. This means that, if output per head continues to rise at about the same rate as in the past eight years, the annual increase in money wage rates consistent with price stability is of the order of 2½ per cent per annum, in contrast to the 6 per cent per annum or so which has occurred since 1948.

The problem before the Council, in my view, is first to ensure that this is made plain; secondly, to insist that to try and keep the rate of increase of money incomes down to something like 2½ per cent per annum, on average, by restricting total demand will be a hazardous and uncomfortable process involving an unknown amount of unemployment, much social strain, and a serious risk of reducing the rate of industrial progress; and thirdly, to try to discover and suggest the conditions which are necessary if the rate of increase in incomes is to be geared to the growth of productivity and the needs of price stability.

It is clear that large changes in attitudes, of Government, employers and Trade Unions, will be required; and that the task of replacing the present feeling of conflict and suspicion with the necessary co-operation will be very formidable.

In this context the idea that price stability can be achieved by reducing the level of demand is dangerous, since it is a view which implies that it is desirable to attack the power of the Trade Unions, and that the way to do this is to use the threat of unemployment. The strains that will be produced by attempting to reduce the power of the Unions in this way are liable to provoke much conflict; and even if such a policy were to succeed, the balance of power it would produce would be much more of an uneasy armed truce than a genuine and lasting settlement. What is needed is not to attack the power of the Unions, but to create conditions in which the Unions will be willing to use their power in a different way.

Traditionally, increases in money wages are the method whereby Trade Unions improve the living standards of their members. Voluntary restraint in pressing for wage increases is liable to be interpreted as an abdication of the Unions' responsibility. The Unions will only be prepared to co-operate in moderating demands for higher incomes if they can be given appropriate safeguards, so that they can convince their members that they are still acting in their interests. These safeguards that the Unions require will depend on the political atmosphere, and what the Unions think they need to retain the confidence of their members. The following paragraphs outline some of the main economic issues involved.

The first, and very obvious, problem is that if money wages are to rise less rapidly, the growth of wage-earners' living standards must be kept rising at the full rate which the growth of productivity (and the country's other economic needs) will permit. This implies that all reductions in costs which can be achieved, whether they result from falling import prices or from increases in productivity, should be passed on as soon as possible in lower prices. The wider implications of this rather obvious statement are less well understood. The general proposition that the rate of increase in incomes should be kept in line with the average increase in output per head does *not* imply that all increases in productivity are justifiable grounds for increases in money incomes. Nor does it imply that wages must necessarily remain constant in industries where productivity cannot be increased. The rate of increase in productivity is very different in different industries. Those sectors of industry (in particular manufacturing) where technical progress is rapid and improved methods are easily adopted, are likely to enjoy rates of increase in productivity substantially greater than 2½ per cent per annum. In these industries, productivity ought to rise much faster than money wages, so that costs can be expected to fall and allow scope for price reductions. In the industries in which technical conditions offer little or no scope for productivity increases, wages will probably have to rise only a little slower than in the expanding industries (to maintain a balance between the supply and demand for labour in different occupations, and to avoid undue pressure for 'equality of treatment' in the industries where productivity rises less than average); thus, in these industries which achieve less than average productivity increases costs and prices will tend to rise. In other words, average long-period price stability implies that some prices will be rising and some prices falling. This will only happen if the industries in which productivity increases faster than money incomes can be induced to pursue a forward-looking and active policy of price reduction.

In this context, the position of the nationalised industries needs to be elucidated. In recent discussions the nationalised industries have been blamed both for agreeing to substantial wage increases and thus 'setting the pace for inflationary wage claims,' and for putting up their prices—particularly coal prices and railway rates—and so causing general increases in costs and prices throughout the economy. I do not wish to suggest that administration, efficiency, pricing policies or labour relations in the nationalised industries are perfect. Far from it. But the criticism that it is the nationalised industries which have been setting the pace for inflation is misconceived; and has greatly confused understanding of the real problem of price stability. Both the coal industry and the railways have a long-standing history of difficult labour relations; and the economic problems which confronted both these industries at the end of the war would have been very formidable even if there had been no question of nationalisation. Both in coal-mining and on the railways it had proved difficult to increase output per man employed at anything like the rate at which productivity in manufacturing industry has been increasing. But, if wages in coal-mining increase less rapidly than in other occupations, there is a tendency for labour to go into other industries; and there is a similar probability that skilled labour on the railways also tends to shift into more remunerative engineering trades if the relative position of railwaymen worsens. This implies that the pace at which the coal industry and the railways increase their wages is determined, not simply by productivity trends, but by the trend in earnings in other occupations. Even if labour does not shift out because of larger increases of earnings elsewhere, the fact that earnings are higher elsewhere may make it impossible to get sufficient new entrants to balance the numbers retiring. Given the trends in productivity, railway rates and coal prices must be expected to rise relative to other prices, simply because productivity in coal-mining and railways rises less rapidly; and this tendency is likely to persist even if the average price level remains stable. These arguments apply with equal force to the Civil Service, the National Health Service, and other forms of public authority employment.

A second obvious prerequisite of a policy designed to keep the growth of money incomes in proper bounds is that there should be some explicit arrangement to prevent the distribution of profits in the form of dividends from increasing any faster, in total, than wages and salaries. Similarly, it would probably be necessary for the Government to prevent obvious signs of a disproportionate increase in Stock Exchange values.

The disadvantages of statutory price control and dividend control as a means of achieving these conditions are very obvious. But if statutory controls are to be avoided, the Unions need to be assured that they can obtain redress if there is evidence that cost reductions are not being matched by price reductions, or if property incomes tend to rise faster than incomes from employment. At present the only method the Unions have at their disposal to redress the balance of economic forces is to press for wage increases. Unless they have a real guarantee that they can maintain their position by other means, the first signs that employers may not be playing their part in maintaining price stability, or any developments that suggest that the distributions of income is shifting to the wage-earners' disadvantage, will lead to renewed pressure for higher wages; and so to renewed pressure on costs and prices.

In the long run, the Council itself may be able to exercise a profound influence on attitudes to these questions. If the Council can gain a measure of confidence from both sides of industry, and is prepared to make firm public statements commenting on economic developments as they are identified, to the effect that specific failure to reduce prices or specific tendencies to increase dividends will make it impossible for the Unions to maintain the necessary moderation in wage claims, as well as to comment on the economic implications of the scale of wage demands, it should be possible to create a public opinion which will make such statements difficult to ignore.

The immediate problem however is to get a general acceptance of the need to establish stability. Even if this need is accepted in principle, there are a number of difficulties to be overcome. First, there is the problem created by the timing of wage claims. If a start is to be made in moderating the claims for higher money incomes, the Unions which will be required to make the start are those which are about to make claims; and these will be precisely the Unions which regard further increases as most overdue. The first Unions to adopt restraint will find that their position may be worsened in relation to that of other Unions which have enjoyed more recent increases. Second, there is the danger that after claims for higher incomes are moderated, prices may go on rising, as previous increases in costs finally get passed on as higher prices. Thirdly, there is the possibility that import prices may rise at an awkward moment, that retail prices will be forced up by the rise in prices overseas, and thus provoke wage demands to match the consequent increase in the cost of living.

These three dangers are very real: if the first steps in demands for higher incomes are followed by a fall in the purchasing power of wages and other incomes, the whole attempt will break down. If the Government is to create conditions in which the beginnings of a sensible income policy can be worked out, it must be prepared to take action—including if necessary the guarantee of *temporary* price controls and subsidies—to ensure that any attempt to get wages (and other incomes) rising at about the right rate does not break down at the outset. Price controls and subsidies are undesirable as a permanent feature of the economic system: but the cycle of wages rising faster than output per head can only be broken if prices are kept sufficiently stable for long enough to break the self-generating element in the process. The dismantling of any temporary price controls and subsidies which may prove necessary should not prove unmanageably difficult, provided that, first, in some parts of the economy cost reductions are being passed on in lower prices, so that overall price stability can be maintained while subsidies are reduced; and provided, second, that they are not dismantled without reference to those whose position they were designed to protect.

The development of systems of negotiation and consultation that will make it possible to keep the growth of money incomes down to that which is warranted by the rate of increase in productivity is something that will have to be worked out over a period of time, in detailed discussion between Government, Trade Unions and employers. If the Council can get the importance of developing such arrangements accepted, it will achieve something of the first importance; it should also be able to elucidate, in the course of discussions with those concerned, the kinds of practical steps which will be necessary to implement the general principles discussed above.

In doing so, the present arrangements for wage negotiations appear to have certain features which require examination:

(i) The fact that individual wage claims are formulated, and put forward, by individual Unions at different times means that it is impossible for the general economic implications of an individual claim to be seen very easily. Would it be possible to devise arrangements whereby all the major Trade Unions could agree to put forward their wage claims at much the same time, so that the *total* effects of the sum of individual claims could be seen in perspective?

(ii) The idea that there is usually an ' annual round ' of wage increases is gaining general acceptance; and it is certainly true that claims are put forward at frequent, though not necessarily very regular intervals. Could arrangements be devised by which wage agreements were concluded for a stated period of time (preferably for two years, not one) with the safeguard that such agreements could be referred to arbitration before they expire if there was evidence that the gains in reductions of costs were being taken out in higher profits, and not in lower prices, or if the cost of living increased by more than a certain amount (by more than, say, 4 or 5 points on the retail price index)?

(iii) There is no evidence that the present system of wage negotiations leads to unjustified increases as between one occupation and another. If the rates of pay in one industry or occupation rise too slowly in relation to those in another, either the industry will find that it is losing labour to other industries, and be forced to pay higher wages, or else the Trade Unions concerned will find that they can make up what they have lost at a later stage. The fixing of relative increases can only be decided in the light of the detailed circumstances of the trades concerned. Under present circumstances, what is wrong is that the general rate of increase is too fast to permit stability of costs and prices. Is there any arrangement whereby collective bargaining can establish the increase appropriate to individual trades, but the individual agreements can be scaled up or down so as to keep the *total* increases in the national wages bill down to the 2½ per cent or so which productivity trends would justify?

(iv) The position of Wage Boards and Arbitration Tribunals will also require careful examination if their independent status is to be preserved, and at the same time their decisions made to accord with the overall requirements of price stability.

CONCLUSIONS

It has been argued in this paper that we do not know how big a reduction in demand and production, or how much unemployment, would be required to achieve price stability; nor do we know how long production and employment would have to be held at this lower level before existing attitudes to wage bargaining became sufficiently modified for it to be possible to permit some re-expansion of demand without running the risk of renewed pressure on costs and prices. The answer to these questions can only be determined by experiment: and it is unrealistic to suppose that experiments of this kind can be conducted without serious risks. In view of the possible effects of such a policy on industrial relations and on investment, productivity and technical progress, it is of the first importance that a less hazardous method of maintaining price stability should be found.

If price stability is to be maintained, increases in money incomes must be related to the increase in productivity, not industry by industry, but over the economy as whole. Until we can increase our rate of productivity growth the rate of increase in money incomes which is consistent with price stability is (on the basis of recent trends) about 2½ per cent per annum. The only way of achieving this which does not involve reducing the level of demand is a policy involving co-operation between Trades Unions, employers and the Government, by which the growth in money incomes is voluntarily kept in balance with the growth in productivity. Of those concerned the Trades Unions are the most likely to feel that their position will suffer by co-operating in such a policy, the need to devise politically acceptable safeguards which will satisfy the Trades Unions will have to be faced. Otherwise the problem is likely to remain unsolved.

I would urge the Council that its first report should state these conclusions in the most forcible terms. The Council may find some difficulty in presenting conclusions of this kind, since on the one hand this view has always been regarded by the Trades Unions with considerable suspicion, while on the other, they might be thought to amount to a serious (if partly implicit) criticism of present Government policy. The Council should not, in my view, be deterred by this. A policy which secures price stability by voluntary agreement is greatly preferable to the risks and uncertainties inherent in any attempt to control wages and prices by reducing the level of demand; indeed, it is the only policy which affords any reasonable assurance that price stability can be achieved without threatening full employment and a rapid rate of economic growth. Recent Government action has made the public much more conscious of the problem of price stability. If it can take advantage of this opportunity, the Council may be able to lay the foundations for a long-run solution that does not run counter to the other objectives of economic policy. I see little prospect of such a solution being implemented otherwise.

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INFLATION AND THE EARNINGS GAP[1]

By H. F. Lydall

Introduction

The current debate amongst economists about the causes of inflation is of obvious practical as well as theoretical importance. If one believes that excess demand is the cause of the persistent rise in prices, then the measures adopted in the past two years may be justified. This is clearly the point of view of the Cohen Council. On the other hand, if the inflation is mainly due to a rise in costs, restriction of demand may not achieve the aim of reducing prices but may merely result in cutting output and the rate of economic growth. This, in the opinion of many economists, is the great danger implicit in the continuation of present policies.

The discussion of these issues is often confused by the fact that the argument is proceeding at two levels. On the first level, the question is whether fluctuations in demand affect prices, *even when cost conditions are unchanged.* In other words, it is a question of whether excess demand causes a profit inflation. If one accepts the traditional conception of a smoothly rising supply curve and a reasonably perfect market, this automatically follows. But once it is recognised that, at least in manufacturing and service industries, the characteristic arrangement is for prices to be ' administered ' at ' full cost ', it is clear that the old concept of a rising supply curve is inappropriate. The supply curve for the output of the full-cost firm is horizontal up to the point of maximum capacity—after which it becomes vertical. The vertical part is, in practice, generally non-operative since, when output at the full-cost price is not sufficient to meet demand, orders are usually allowed to pile up and customers have to wait for delivery. In this situation an increase in demand for the products of full-cost industries will simply result in greater output at the same price level up to the point of maximum capacity. ' Excess ' demand only exists when orders are increasing faster than output and the stock of unfilled orders is growing. When demand is high, profits will, of course, be high; but this is simply the result of maintaining a constant overhead and profit margin over a larger output. The existence of an overhead element in costs means that profits will fluctuate more than in proportion to output.

If we lived in a closed economy and all our enterprises—including farming—operated on the full-cost principle, there would be no influence from the demand side on the gap between prices and labour costs. Where demand clearly does have an influence on this gap is in agriculture, and more especially on the price of imports of food and raw materials. It is only too obvious that it was excess demand which caused the enormous rise in world commodity prices in 1950–51; and it is equally obvious that it is the decline in world demand, relative to output, which is responsible for the fall in these prices at the present time. To that extent, those who believe in the power of demand are justified: if we want to cut the prices of primary products we can always do so by reducing demand in the advanced industrialised countries. It should not be forgotten, however, that, since in the short run both the demand for and supply of primary products is very inelastic, the effect of cutting back the demand for these products is to induce an extremely sharp fall in the incomes of primary producers. The economic and political consequences of such a policy may, therefore, be somewhat risky, to say the least.

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[1] A number of helpful comments and suggestions have been made by Mr. K. G. J. C. Knowles, but he must not be assumed to be in agreement with all the opinions expressed.

But there is a second, and more difficult, level at which the discussion of the effects of demand on prices is proceeding. This is the level of *derived* demand. High demand, it is said, is responsible not only for raising prices directly, thereby increasing profits, but also for raising the prices of the factors of production—especially of labour. Here attention is drawn to the persistent upward trend of wage costs over the past two decades; and it is argued that this, in itself, is *prima facie* evidence that we have been suffering from excess demand.

It is possible to think of assumptions on which the ' excess demand ' explanation of the rise in wages would be justified. But the adherents of this view have so far done little to explain the mechanism through which a rise in wage costs per unit of output is actually brought about. One might expect that some attempt would be made to establish an empirical relation between changes in demand and changes in unit wage costs. It is, indeed, customary in this connection to refer to the statistics of employment vacancies and to compare them with the number of unemployed; but no-one has yet shown that a clear relationship exists between ' excess demand for labour ', as measured in this way, and the rate of increase in unit wage costs.[1]

In recent months a new argument has been developed to give empirical support to the ' demand ' theory of wages. The argument has been used by several economists, notably Professors Robbins and Paish and Mr. B. C. Roberts.[2] It has also been employed by the Cohen Council and the British Employers' Confederation.[3] Perhaps the best statement of the theory is that which occurs in the *First Report* of the Cohen Council.[4] It runs as follows:

'Another important feature of the period . . . has been the tendency for average earnings to rise faster than weekly wage rates. The reasons for this are complex, but there seems no reason to doubt that one of them is the tendency of some employers, in time of high demand, to attract labour by bidding up its price above the figure embodied in national agreements and awards. Here too, as we should expect, the extent of the gap seems to vary with the intensity of demand.'

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[1] A useful index of ' excess demand for labour ' has been compiled by J. C. R. Dow and L. A. Dicks-Mireaux. See ' The Excess Demand for Labour. A Study in Conditions in Great Britain, 1946–56 ', *Oxford Economic Papers*, February 1958. The authors do not, however, attempt to relate their index to the rise in wage costs.

[2] Professor Robbins in the *Financial Times*, August 28th, 1957; Professor Paish in the *District Bank Review*, March, 1958; Mr. Roberts in *The London and Cambridge Economic Bulletin*, September, 1957.

[3] *First Report of the Council on Prices, Productivity and Incomes*, 1958, para. 82, and 1957 *Report* of the British Employers' Confederation (quoted in *The Times*, March 5th, 1958).

[4] *Loc. cit.*

Professor Paish puts the matter this way:

'If the general level of wage rates had been forced up by trade union pressure, it is difficult to see why actual weekly earnings, which are largely within the control of employers, should have risen faster than wage rates; whereas if they have been forced up by the competition of employers for scarce labour this development is quite intelligible.'[1]

He adds that it was 'for this reason' that between 1946 and 1951, while wage rates rose by only 24 per cent, weekly earnings rose by 43 per cent.

Professor Robbins, who argues the case most forcefully, believes that if our inflation were wage-induced, wage rates would rise faster than earnings, rather than the other way round.[2]

The attention which has thus been drawn to the relative movements of earnings and wage rates is welcome. For it is a very striking phenomenon and challenges an explanation. But I believe that the interpretation placed on it by the above-quoted authors may well be mistaken; that a widening of the earnings gap may be not so much a sign of *inflation*, at least in the sense of a rise in prices, as of potential *deflation*. There is, of course, a difficulty in the ambiguity of these terms. 'Inflation' may mean an increase in money incomes, in the money supply, or in the general price level; and some people even use the term to mean a government deficit. The problem with which we are concerned is the stability of the general price level and I shall use the word inflation to mean a rise in this.

If this is what we are after, then the important question is, not whether wage rates or earnings rise, but whether they rise faster than output. What I propose to show below is that a widening of the earnings gap generally indicates that output is increasing, and indeed that output is increasing *faster* than the earnings gap itself. Although it is undoubtedly true that the earnings gap widens when demand increases, and *vice versa*, this is in a sense a 'spurious correlation'. Increasing demand results in increasing output—provided the productive capacity to meet the demand exists—and increasing output entails an increase in the earnings gap. Hence, it is not simply demand as such that causes the widening of the gap but the translation of demand into output. It is not primarily a process of 'bidding up' wages but of paying more for more work; and since the extra wage cost is smaller than the extra output produced, the net effect is likely to be deflationary rather than the reverse.

THE RELATION BETWEEN EARNINGS AND WAGE RATES

A gap between earnings and wage rates can be caused by one or more of the following influences: first, shifts in the composition of the labour force by age and sex; secondly, changes in the relative importance of different industries and occupations; thirdly, changes in the hours of work; fourthly, changes in piecework earnings resulting from increasing output per worker;

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[1] *Op. cit.*, p. 10.

[2] *Loc. cit.*

and fifthly, changes in individual or group payments made by employers beyond the rates approved under national agreements.[1]

Now it is obvious that, if there is any ' bidding up ' of the price of labour by competition between employers for scarce labour, its impact on earnings will be made through the last of these components. Nobody knows how much of the earnings margin can be attributed to such extra payments, although there is a good deal of talk amongst employers about ' temptation ' and ' bribery ' rates. My own view is that much of this is merely an enforced adaptation of individual firms' rates to changes in the earnings situation amongst their immediate competitors. I shall elaborate this idea below. But one thing is certain, namely, that only a part of the earnings margin can be attributed to this cause. Penrice's figures for 1948–55 show that the influence of shifts in the sex and age composition of the labour force and of changes in the importance of different industries in this period was small, and about half the earnings gap was caused by changes in the number of hours worked. The other half has to be divided between the effect of changes in piecework earnings and in the ' above-rate ' payments. I now propose to show that piecework earnings are likely to account for a substantial part of this.

Let us start by considering the conditions under which piecework earnings fluctuate. Such fluctuations may be the result of (1) a change in the piece rate or (2) a change in output per pieceworker. Changes in piece *rates* may either be the consequence of changes in the basic wage rate, following some national or regional agreement, or of changes in the specific rate applicable to a particular job. Changes in nationally or regionally agreed rates presumably enter into the Ministry of Labour's wage-rate index. Hence, changes in the margin between piecework earnings and the official wage rate (other than those caused by overtime payments or special merit rates) must be due either to a change in the rates for specific jobs or to a change in output per worker.

Changes in individual job rates will usually be the consequence of a change in the product or the process of production. Such changes are especially likely to occur when there is a change in the machinery or equipment provided. They will, therefore, be discontinuous. In general, it may be expected that the rate for a new job—or new process—will be set at a level which will yield the pieceworker not less than the weekly earnings received on the previous job. The business of fixing piece rates is, however, a very tricky one. When a new job is first introduced the worker will be unfamiliar with it, the new tools may not be fully adapted to their purpose, and the supply of parts or components may still need some adjustment. In all these—and perhaps other—ways there will be room for improvement. Once the price for the job is fixed, it will be possible for the worker—or group of workers in the case of a gang piecework system—to develop more efficient ways of doing the job.

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[1] See G. Penrice, ' Earnings and Wage Rates, 1948–55 ', *London and Cambridge Economic Bulletin*, December 1955.

There are often important improvements in technique that can be introduced in this manner on the initiative of the workers themselves; and it is, of course, one of the main purposes of a piecework system to stimulate such improvements. But increased output per worker may also be the result of a general improvement in factory organisation, better co-ordination of processes, more careful planning of the sequence of operations, a smoother supply of components, and so on. Many of these improvements, both in the worker's own technique and in the wider organisation, are likely to be induced by increased pressure of demand; so that, if the job prices are already fixed, increased demand will automatically result in higher piecework earnings. Thus a connection can be established between fluctuations in demand, in output and in piecework earnings.

But, it may be objected, there is no logical reason why piecework earnings per worker should fluctuate with total output. Would it not be more rational for an employer to ensure that his pieceworkers are always fully employed and working to the maximum of their willingness? When he needs to vary his total output—because of a change in demand—he can do so by varying the *number* of pieceworkers he employs, not their average output. The answer to this is that conditions in the labour market and in the structure of industrial organisation are not such as to make this type of adjustment possible in all circumstances. Labour, as a factor of production, is not perfectly divisible, nor are the complex processes within industry completely adjustable. Much labour is, within limits, an overhead cost, which must be spread over larger or smaller outputs according to the state of demand.

Moreover, when the economy has been operating for some years near to the full employment ceiling, many employers are afraid to adjust themselves to a slight recession of demand by sacking part of their staff, in case they should find it impossible to replace them when demand recovers.[1]

We have seen that, so far as pieceworkers are concerned, a direct relation is likely to exist between output and earnings. Let us now consider some examples of the form which this relation may take in particular cases. Consider, first, the case of a firm in which *all* the operatives are on piecework and their *entire* earnings are in this form. The former assumption is unlikely to be true of any actual firm, but the latter assumption is true of pieceworkers in some firms in, for example, the textile industry. Let us assume that the workers in this firm are paid 1s. a piece. Then, if they produce on the average 100 pieces a week, their average weekly earnings will be £5. Now suppose that, without any change in the equipment or in the number of hours worked the number of pieces produced per worker goes up to 120 a week. Then earnings will be £6 per worker. Since wage rates as such are assumed not to have changed, there will be a ' gap ' or ' margin ' between earnings and wage rates, or more strictly a gap between the relative change in earnings and in wage rates. Earnings have increased by 20 per cent, wage rates not at all; and the earnings gap has therefore widened by 20 per cent of the initial earnings figure.

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[1] The 'overhead' character of much office and supervisory labour is well known; but the same tendency is growing amongst manual workers, partly perhaps as a result of the increasingly complex internal organisation of large firms and partly because of trade union resistance to redundancy. Whatever the reasons, it is a striking fact that in recent years fluctuations in output—both upwards and downwards—have always been greater than fluctuations in employment. Two important corollaries flow from this relationship: first, that it is unlikely that output per worker can be increased by deflating demand; and secondly, that the unemployment figures do not accurately measure the degree of under-employment of total resources. At the present time, for example, the degree of under-utilisation of productive capacity is perhaps four or five times as great as the 2 per cent of recorded unemployment.

It should be noted that, in this example, the increase in earnings is exactly equal to the increase in output and is entirely caused by it. Moreover, since output and wage earnings have moved *pari passu*, wage cost per unit of output has remained constant. If the firm is assumed to fix its prices on the ' full cost ' principle, *i.e.* on the basis of direct costs of labour and raw materials, there will be no reason from the wage cost side why prices should rise. Hence the widening of the earnings margin, in this case, will not be associated with a rise in prices.[1]

Next, let us take the case of a firm in which all workers are on piecework, but only part of their earnings are related to output. Of these two assumptions, the former is again unrealistic but the latter is to be found in many industries. For example, in the engineering industry it is the standard rule that part of a pieceworker's earnings is calculated on a time basis (i.e., according to the number of hours he is at work) while the other part varies with his output. The relative proportions of these two parts varies from worker to worker, from week to week, from firm to firm, and from one wage settlement to another, but a typical situation would be one in which two-thirds of a pieceworker's weekly earnings were time-based and one-third earned from piecework. Let us assume that this situation existed in our factory in the initial position, with each worker receiving 66s. 8d. from time work and 33s. 4d. from piecework, £5 in all. This means that, if the workers are producing 100 pieces each, the rate is 4d. per piece. What is now the effect of an increase of output to 120 pieces per week? Piecework earnings rise by 20 per cent; but total earnings rise by only 6⅔ per cent. Since, as before, the wage rate has remained unchanged, the earnings gap will have widened by 6⅔ per cent.

In this example the rise in output is *three times as great* as the increase in the earnings gap and, since wage costs per unit have actually fallen, there is no reason to expect that prices will be raised (unless the increased demand for raw materials raises raw material costs very substantially). If prices are kept constant (and raw material prices are unchanged) the effect of the increased output will be to raise total incomes in the same proportion as total output; but since wage incomes will have risen by only one-third of the rate of increase of total incomes, non-wage incomes—especially profits—

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[1] If prices are fixed by ' supply and demand ' there is equally no reason why they should rise as a consequence of a change in output and earnings of this sort, since the proportionate increase in wage incomes is equal to the proportionate increase in output, and there is no reason why the proportionate increase in non-wage incomes should be any higher. It might well be lower; and, if allowance is made for a rising marginal propensity to save, and for the influence of direct taxation, the net effect on the balance of demand and supply is likely to be mildly deflationary.

will have risen much faster. In this situation the marginal propensity to save is likely to be high, and a substantial part of the additional output will be available for investment. It is clear, therefore, that a rise in the earnings margin which comes about in this way is not necessarily a sign of inflation or of a shift of resources from investment to consumption, but could well be a sign of exactly the opposite tendencies.

If all workers in all industries were pieceworkers and if the earnings of all of them were related partly to their hours of work and partly to their output—as in the example just considered—then the initial effect of any general increase in output (without any change in hours worked) would be deflationary, in the sense in which I have used the word above. But this situation would not be, except in a very special case, a stable one. For the increase in the earnings of each worker would depend on two things: first, the proportion of his piece earnings to his time earnings at the beginning of the period; and secondly, the increase in his output—and hence in his piece earnings—during the period. In any actual situation these two ratios will be different for different workers, so that the effect of a general increase in output will be to raise the earnings of some workers more than others.[1]

Repercussions of Increases in Piecework Earnings

Before we proceed, it is desirable to remove one of the simplifying assumptions made so far. This is the assumption that *all* the wage earners in a given firm or industry are pieceworkers. It is, of course, an unrealistic assumption, since there are always some ' overhead ' jobs that need to be done in any firm, such as maintenance and repair of machinery, toolmaking, transport, storage, and sweeping up. There are also some processes in most firms which cannot easily be put on a piecework basis, such as experimental and development work, the operation of machines which require specially skilled attention, or where the machine paces the job. Then, of course, within any industry there are usually some firms which do not have a piecework system but pay their workers solely on a time basis.

According to figures collected by the Ministry of Labour about 40 per cent of all workers in manufacturing are on some system of payment by results (not including good time-keeping bonuses, merit payments, profit sharing or co-partnership). The proportion increases very markedly with the size of the establishment (see Table 1), mainly because the proportion of establishments operating a piecework system increases with size. In establishments with 10 or fewer wage-earning employees only about one in ten have any sort of piecework system, while, at the other extreme, amongst establishments employing 1,000 wage-earners or over nearly nine out of ten have a piecework system. It is interesting to note that in firms which have a piecework system only half or a little more of the wage-earners employed are paid wholly or partly on peicework. (The rise in this percentage in the larger size groups shown in column 3 of Table I is probably partly an effect of the increasing proportion of establishments operating piecework systems *within* each size range shown). The proportion of establishments operating piecework systems varies in different industries. In gas, water and electricity it is negligible; in motor repairing and garages less than 5 per cent; and in printing less than 10 per cent. On the other hand, in cotton textiles it is nearly 90 per cent; in metal manufacture nearly two-thirds (with 100 per cent in sheet steel); and in clothing over 60 per cent. In manufacturing industry as a whole the proportion is about 44 per cent for establishments employing 11 or more wage-earners, but, as we have seen, only 11 per cent or less for the smaller establishments. The weighted average for all establishments, irrespective of size, would be about 20 per cent, but this is heavily influenced by the multitude of very small firms, which are of little consequence in terms of output or employment.

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[1] In a limiting case there might be two groups of workers, one of which derived all its income from piecework and the other group none. *Cf.* J. R. Hicks, ' The Instability of Wages ', *Three Banks Review*, September, 1956.

TABLE I

Piecework in Manufacturing, October 1957

Size of establishment (number of) wage-earners)	*Establishments with systems of piecework as percentage of all establishments in the group*	*Workers employed on piecework as percentage of all workers in the group*	*Workers employed on piecework as percentage of all workers in piecework establishments*
1—10	11	7	50
11—24	23	12	50
25—99	42	23	51
100—499	66	38	55
500—999	80	47	58
1,000 and over	88	56	64
All	38*	41	58

* Since establishments employing up to 10 were under-represented in the sample, this figure is not a reliable estimate of the proportion of all manufacturing establishments operating a piecework system.

Source: *Ministry of Labour Gazette*, April 1958, p. 128.

Now the question arises: What is the effect on non-pieceworkers employed in pieceworking firms of a rise in the earnings of the pieceworkers? And further, what is the effect on the workers in non-pieceworking firms of a rise in the earnings of pieceworkers (and perhaps also of timeworkers) in pieceworking firms within the same industry? No comprehensive or statistical evidence exists for answering these questions; and we are therefore obliged to consider them in the light of general principles, together with such fragmentary evidence as can be collected from those with a knowledge of industry. I think it will be generally agreed that a rise in the earnings of one group of workers within a firm, which is not entirely attributable to their working ' harder ' or for longer hours, will set up tensions, or disequilibria, within the firm. If pieceworkers' hourly earnings are rising because of a general increase in output, then sooner or later the management of the firm will be obliged to concede some increase in earnings to other workers in the same firm whose wages are time-based. This is sometimes arranged quite simply by giving the timeworkers a ' lieu ' rate, which is related to the average piecework earnings of the pieceworkers. Where such a system does not exist the management may have to resort to other methods of maintaining the differentials, for example, by merit rates, special departmental rates, and so forth.

The problem as it presents itself *within* pieceworking firms is capable of fairly ready solution along these lines. Since the increased earnings of the pieceworkers are the result of a rise in output per worker, the firm can usually afford to add to the earnings of the non-pieceworkers in the same proportion and still make greater profits. More heartburning is caused, however, over the discrepancies which emerge between earnings in different firms in the same industry. There are, it is true, very wide and unexpected differences between firms within the same industry in the average level of their workers' earnings.[1] Nevertheless, it seems reasonable to believe that if, within a certain industry and in a certain area, hourly earnings in Firm A go up, sooner or later pressures will be exerted to push up earnings in Firms B, C and D. The mechanism may be very imperfect and there may be substantial time-lags. But I would argue that a rise in piecework earnings in Firm A will set up a *tendency* for earnings to rise in non-piecework firms within Firm A's orbit of influence in the labour market.

This is a point which needs more detailed consideration. It is well known that many employers have been obliged in recent years to pay their workers rates above the nationally agreed rates. On one interpretation the existence of these ' bribery ' rates is a living testimony to the fact of excess demand for labour. But this is not a necessary conclusion. It may be that these extra payments simply reflect the fact that earnings in some firms have got out of line with earnings in other firms in which piecework systems operate; that, in other words, they are not a symptom of a ' bidding up ' of the price of labour but of a readjustment of rates within an industry in which temporary disequilibria have arisen. It is difficult to believe that ' bidding up ' of the price of labour is generally a sensible policy for firms to pursue, even when there is tightness in the labour market, since the marginal cost of labour obtained in this way is very high. Oligopoly—which is the typical situation—makes the cost even greater.[2] But if, for reasons beyond an individual firm's control, earnings per worker increase, as they do under the piecework system with rising output, then the other firms in that market area must sooner or later adjust themselves to the new situation or face increasing labour unrest.

From a theoretical standpoint this view of the labour market is based on the belief that the supply curve of labour to an individual firm is kinked. The left-hand portion is an almost horizontal line, whose position is determined by the earnings of labour in alternative occupations, whilst the right hand portion rises sharply in reflection of the oligopolistic situation in the labour market. The position of the kink—or the price of labour, in the sense of the average earnings for a normal week—will be influenced partly by collective bargaining over wage rates and partly by the effect on piecework earnings of the level of output. When there is a rise in the nationally agreed rate, non-union firms are obliged—under conditions of near-full employment—to give approximately the same increase to their workers; similarly, when earnings rise in piecework firms, timeworking firms will sooner or later have to conform. The price of labour in money terms has a ratchet, maintained by trade union and other resistances, which prevents employers from cutting rates except by prolonged and bitter struggles. I cannot, therefore, believe that employers will voluntarily push that ratchet up, although I grant that it may be difficult in practice to distinguish between the process of pushing up the ratchet and of re-establishing an appropriate relationship to a wage-level which has already been lifted up by other forces.

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[1] *Cf.* T. P. Hill and K. G. J. C. Knowles, ' The Variability of Engineering Earnings ', this Bulletin, May 1956.

[2] *Cf.* G. C. Archibald, ' The Factor Gap and the Level of Wages ', *Economic Record*, November 1954.

Irrespective of the view one takes of the significance of ‘ bribery ’ rates, I think it is obvious that an increase in hourly earnings in piecework firms, as a consequence of increasing output, will gradually spread its effects through the industries to which those firms belong. And these effects are most likely to take the form of special increases in rates in non-piecework firms, beyond the national agreements. Indeed this is inevitable; for the problem is one of re-establishing ‘ relativities ’ between two groups of firms in the same labour market. A change in the national rate would do nothing to correct this disequilibrium; therefore, individual firms must necessarily bring themselves into line by individual action.

Within the national economy we may broadly distinguish two sectors, which I shall call the piecework sector and the non-piecework sector. More conveniently they may be referred to as Sector A and Sector B. Sector A consists of those industries in which an appreciable proportion of the workers are on piecework. It is not possible to draw a strict line of division; but it seems reasonable to regard any industry in which 25 per cent or more of the workers are on piecework as likely to be subject to their influence, while industries in which 10 per cent or less are on piecework are unlikely to be affected by changes in piecework earnings. Industries with between 10 and 25 per cent of pieceworkers are intermediate; but it happens that there are not very many of them. Industries which contain 25 per cent or more pieceworkers include most of manufacturing, mining, and—from the service trades—laundries and dry-cleaning. Those with less than 10 per cent of pieceworkers include certain manufacturing industries which handle bulk commodities by continuous processes—such as grain milling, oil refining and cement and others which are closely associated with retailing—such as garages, bakers, and meat and milk products. Apart from these, the bulk of Sector B consists of public utilities and service trades, such as gas, electricity and water, transport, distribution, banking and insurance, public administration, the professions and a wide variety of other services. It also includes agriculture. Altogether about half of our total manpower is in Sector A and half in

Sector B, and the two sectors are of approximately equal importance in their contribution to the national income.

Now I wish to suggest that, within Sector A, increases in piecework earnings, resulting from increased output, spread their effects amongst timeworkers predominantly by forcing up the special rates and bonuses paid by individual firms. These help to raise the level of earnings, but they have no direct influence on the national index of wage rates. Hence they contribute to the creation of the earnings gap. So far as Sector B is concerned, however, the effects of increases in earnings in Sector A are communicated mainly through changes in official wage rates. Thus, for example, if in a particular town hourly earnings in some engineering factories go up, as a result of increases in piecework earnings, this will tend to cause *earnings* in other (timeworking) engineering factories to rise, by means of individual increases in rates given within those factories. But the repercussions of this general increase in earnings in engineering will also begin to spread to the workers in the Sector B industries in the town. For example, the bus workers will become discontented; and sooner or later, if the discontent is national in its scope, there will be a demand for a revision of bus workers' wage *rates*. If this demand is not met there will be increasing tension within the trade union movement leading eventually to strikes. If it is met, the official wage rate index will go up.

We may regard the development of wages under full employment (and even perhaps with somewhat less than full employment) as conforming broadly to the following simplified model. Let us assume for the moment that there have been no changes in prices and that hours of work are fixed. Then the first step away from an original ' equilibrium ' will be caused by an increase in output per worker in Sector A. This causes piecework earnings in Sector A to rise, followed by the ' lieu ' rates of timeworkers in piecework firms in Sector A, followed again by the special ' bribery ' rates in other (non-piecework) firms in Sector A. Now earnings in Sector A as a whole have gone ahead of earnings in Sector B. But earnings in Sector B can only be increased in an orderly way by increasing wage rates in Sector B's industries. So the wage rates of the busmen, the railwaymen, the shop workers, the agricultural workers and the civil servants are gradually pushed up. But this in turn causes further repercussions in Sector A itself. The workers in engineering, etc., argue that their increased earnings are the result of greater productivity. They know that profits in their industry are booming. The newspapers tell them that various groups of workers in Sector B are getting increases in their agreed *rates*. So they also demand that their rates shall go up; and a new round of repercussions may begin.[1]

I now propose to examine the workings of a model of this sort. On some assumptions the model will produce an inflationary trend, on other assumptions a deflationary one. What will chiefly interest us will be the possibilities of achieving price stability or, at the most, a one or two per cent annual rate of increase in prices. Given the structure of the model, the outcome depends on the values of the following parameters:

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[1] Workers in Sector A may also be anxious to consolidate their position by securing an increase in their basic timework rates, which can less easily be reduced in times of depression.

(1) The proportions of the national income generated in Sectors A and B respectively, in the initial position.

(2) The rate of increase of productivity (output per worker) in each sector.

(3) The ' piecework effect ' of an increase in productivity in Sector A on average earnings in Sector A, *i.e.*, the percentage increase in average earnings in Sector A which results from a given percentage increase in productivity in this sector.

(4) The ' earnings effect ' of an increase in earnings in Sector A on the level of wage rates in Sector B, *i.e.*, the percentage increase in wage rates in Sector B resulting from a given percentage increase in earnings in Sector A.

(5) The effect on wage rates in Sector A of an increase in wage rates in Sector B.

Empirical information about the values of these parameters is of variable quality. We have already given a rough estimate of (1), and we can make reasonable guesses about some of the others. About one which is of crucial importance—number (3)—we have some partial information, which it will now be useful to consider.

THE STRENGTH OF THE ' PIECEWORK EFFECT ' IN SECTOR A

There are no available figures of earnings, wage rates and productivity in the piecework sector as such, but some approximate indication of the ' piecework effect ' of output on the earnings gap may be obtained by considering the situation in manufacturing. Most of manufacturing is in Sector A; and for manufacturing industry as a whole we have official estimates of wage rates, earnings and output per worker. In Table II I have assembled the relevant data. The first two columns show the annual percentage changes in wage rates and earnings; and column (3) gives the gross earnings gap. For simplicity this has been computed by subtracting column (2) from column (1) instead of by dividing the ratio of earnings in two consecutive years by the ratio of wage rates. But the result is effectively the same. The fourth column shows the percentage changes in output per wage earner and the fifth column the changes in average weekly hours. Adjustments have next been made to the gross earnings gap and to the output changes in order to exclude the effects of changes in hours of work. From the changes in gross earnings I have substracted one-and-a-half times the changes in hours, to allow for overtime rates, while from the changes in output I have subtracted simply the changes in hours. These operations give us, in columns (6) and (7), the net earnings gap and changes in output per worker adjusted for changes in hours.

Now, according to our previous reasoning about the effect of changes in output on earnings in Sector A, we should expect to find a fairly close relation between changes in productivity and changes in the net earnings gap. In

TABLE II

Productivity and the Earnings Gap in Manufacturing
(percentage changes on previous year)

Year	*Wage rates* (1)	*Earnings per worker* (2)	*Gross earnings gap* (3)	*Output per worker* (4)	*Hours per week* (5)	*Net earnings gap* (6)	*Adjusted output per worker* (7)
1949	3.4	4.0	0.6	5.7	0.3	0.1	5.4
1950	1.8	4.8	3.0	5.9	1.0	1.5	4.9
1951	9.4	9.3	−0.1	2.4	0.4	−0.8	2.0
1952	8.5	8.3	−0.2	−3.1	−0.7	0.8	−2.4
1953	4.6	6.3	1.7	4.9	1.0	0.2	3.9
1954	4.2	6.6	2.4	7.0	0.9	1.1	6.1
1955	6.5	8.9	2.4	8.5	0.3	1.9	8.2
1956	7.9	7.5	−0.4	−1.9	−0.8	0.7	−1.1
1957	5.0	5.1	0.1	1.4	−0.3	0.6	1.7

(1) Ministry of Labour index of weekly wage rates in manufacturing.

(2) Average of April and October weekly earnings of all manual workers in manufacturing.

(3) Column (2) minus column (1).

(4) Index of production for manufacturing divided by index of average number of wage earners employed in manufacturing. The latter figure is based on estimates given in the National Income Blue Book for the years prior to 1957. In 1957 it was assumed that the number employed was the same as in 1956.

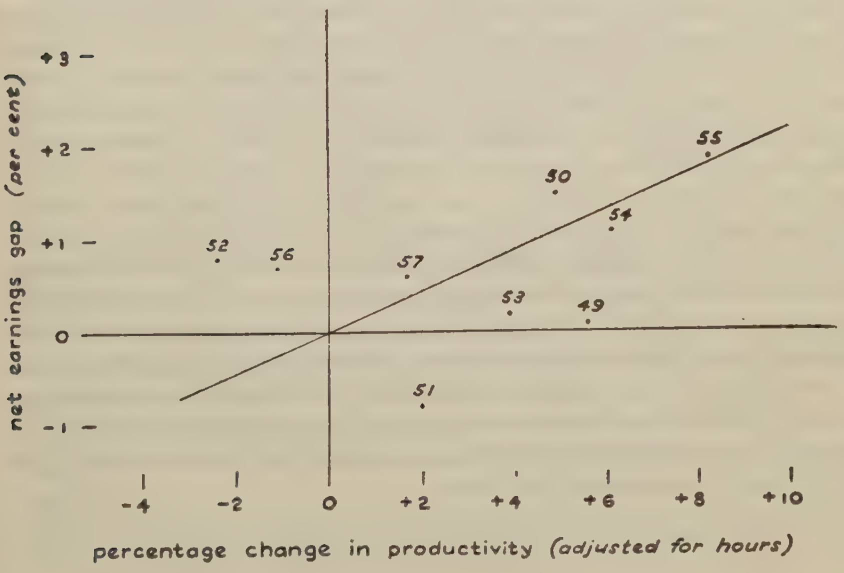
(5) Average of April and October weekly hours of all manual workers in manufacturing.

(6) Column (3) minus $1\frac{1}{2}$ times column (5).

(7) Column (4) minus column (5).

Chart I

Productivity and the Earnings Gap in Manufacturing



order that we may study this relation more closely the figures from columns (6) and (7) of Table II are plotted against one another in Chart 1. The points are somewhat scattered; but they are broadly consistent with the hypothesis that the net earnings gap varies directly with productivity. On the assumption that the ' true ' relation is a straight line passing through the origin, I have drawn in a line which seems to give a reasonable fit to the points. The slope of this line is 0.22 and it implies that for every 5 per cent increase in productivity there will be an increase of 1.1 per cent in the net earnings gap. This, I believe, is a rough measure of the piecework effect of changes in output on changes in hourly earnings in Sector A.

Is this a plausible interpretation of the data? We ought, perhaps, to offer some explanation of the failure of particular years to lie close to the line. This may easily be the result of inadequacies in the underlying figures, or to the lack of correspondence between Sector A as defined in the model and the manufacturing sector which has had to be used in the test. There may also be individual peculiarities in particular years which would account for their deviation from the line. The net earnings gap includes all the effects other than the effect of changes in hours. It will, therefore, be influenced by changes in the composition of the labour force by age, sex, occupation or industry. It will also contain any independent effects of the ' excess demand ' for labour. As we have already noted, changes in the composition of the labour force have had little effect on the earnings gap. It only remains to consider whether ' excess demand ' for labour can claim to be responsible for part of the gap.

If ' excess demand ' for labour is to be given credit for causing part of the earnings gap, we should expect to find that the points which lie above the line in Chart 1 refer to years of high demand for labour, and the points below the line to years of low demand for labour. According to the index of demand for labour compiled by Dow and Dicks-Mireaux the years of greatest demand in our period were 1951 and 1955, and the year of lowest demand was 1952. 1953 and 1954 were years of rising demand; 1952 and 1956 were years of falling demand. When we compare these indications with the position of the points on our Chart we get no real support for the view that excess demand for labour causes an increase in the earnings gap. It must be admitted that the years 1952 and 1956 occupy an awkward position on any hypothesis. In these two years both the demand for labour and output per worker employed in manufacturing declined. Yet the net earnings gap widened. It is worth noting, however, that the *gross* earnings gap did fall slightly in these years. It is the adjustment for average hours worked that converts a negative *gross* earnings gap into a positive *net* earnings gap. A similar difficulty occurs in the case of 1951, where the net earnings gap fell, despite an increase in productivity and in the demand for labour.

THE WORKING OF THE MODEL

We are now in a position to study the behaviour of our model. We shall assume throughout this discussion (1) that hours of work remain unchanged, (2) that the economy is self-sufficient, (3) that all goods and services are priced at 'full cost', and (4) that there is no trade in intermediate goods between Sectors A and B, so that the final prices of each sector's output depend entirely on unit wages costs within that sector.

We shall use the following notation and definitions:

a = basic timework earnings per worker in Sector A.
b = piecework and related earnings (including above-rate payments and 'lieu' bonuses) per worker in Sector A.
c = $a+b$=total earnings per worker in Sector A.
d = total earnings per worker (all from timework) in Sector B.
w_t = percentage change in average time rates of all workers in year t compared with year $t-1$.
e_t = percentage change in total earnings per worker in Sector A in year t compared with year $t-1$.
k = proportionate effect of an increase in earnings in Sector A in one year on the increase in time rates in both sectors in the following year.
p' = percentage increase in output per worker in Sector A.
p'' = percentage increase in output per worker in Sector B.
n' = number of workers employed in Sector A.
n'' = number of workers employed in Sector B.

Thus we have the following relations:

$$c=a+b$$

$$\frac{a_t}{a_{t-1}}=\frac{d_t}{d_{t-1}}=1+\frac{w_t}{100}$$

$$\frac{w_t}{100}=k.\frac{e_{t-1}}{100}=k\left(\frac{c_{t-1}}{c_{t-2}}-1\right)$$

$$\frac{b_t}{b_{t-1}}=1+\frac{p'}{100}$$

Let us consider, first, how the model develops under the following conditions:

(1) In the initial position average earnings per worker and the number employed in Sector A are equal to average earnings and the number employed in Sector B ($c=d$, $n'=n''$).

(2) The number employed in each sector remains constant.

(3) $k=1$.

(4) $p'=5$

(5) $\frac{a}{b}=4$. This is based on the assumption that, since the net earnings gap

appears to increase by about one-fifth of any increase in productivity in Sector A, the proportion of earnings in Sector A which vary directly with output must be about one-fifth. We shall see later that this is not true within the framework of this model.

The effect of these assumptions on the model is shown in Table III. It will be seen that the initial effect of the 5 per cent increase in productivity in Sector A is to produce an earnings gap ($e—w$) of 1 per cent. Gradually, however, the feeding back of the effects of the rise in c into the level of wage rates, with a time-lag of one year, causes the earnings gap to diminish. By year 10 the earnings gap has fallen to 0.16 per cent; and it is obvious that it will continue to diminish with the further passage of time. In other words, the effect of a constant rise of 5 per cent per annum in productivity in Sector A (within the framework of this model) is to produce a series of increases in earnings in both sectors which are convergent towards the same figure of 5 per cent. That this is an equilibrium level can be seen if we consider the situation which would arise if wage rates were to increase in any year by exactly 5 per cent. Then total earnings in that year would also rise by 5 per cent, and wage rates in the following year would continue to increase by the same figure.

TABLE III

Model of the Relations between Wage Rates, Earnings and Productivity in Two Sectors

Year	*Sector A*			*Sector B*	*Percentage change in c*	*Percentage change in a and d*
	Time earnings an'	*Piece earnings* bn'	*Total earnings* cn'	*Total earnings* dn''	e	w
1	400.0	100.0	500.0	500.0	—	—
2	400.0	105.0	505.0	500.0	1.00	—
3	404.0	110.3	514.3	505.0	1.83	1.00
4	411.4	115.8	527.2	514.3	2.51	1.83
5	421.7	121.6	543.3	527.2	3.06	2.51
6	434.6	127.6	562.3	543.3	3.49	3.06
7	449.8	134.0	583.8	562.3	3.83	3.49
8	467.0	140.7	607.7	583.8	4.10	3.83
9	486.2	147.8	633.9	607.7	4.31	4.10
10	507.1	155.1	662.3	633.9	4.47	4.31

What will be the effect of these changes in wage rates and earnings on the price level? The answer depends on the course of changes in productivity. In Sector A, on our assumption of a constant rate of increase in productivity of 5 per cent, wage costs per unit will at first be falling (approximately by the margin between 5 per cent and e). Eventually, when e itself reaches 5 per cent, there will be stability of wage costs in Sector A. The position in Sector B depends on the rate of increase of productivity in that sector. If, for example, we assume a value $p''=2$, then wage costs per unit in Sector B will be falling for the first four years, but thereafter they will be rising at a steadily increasing rate. When w reaches 5 per cent, wage costs per unit in Sector B will be rising by nearly 3 per cent per annum. At this point the average wage cost for the output of both sectors will be increasing at a rate of nearly 1½ per cent per annum; and, on the assumption that prices are fixed at full cost, the average price level will also be rising at this rate.

The above model gives us a picture of an economy which is expanding smoothly and without too much instability of prices. There may however be a danger that the rise in prices will cause a secondary reaction on wage rates; and if this happens the situation will obviously become less satisfactory. Let us then consider what are the requirements of a situation in which average prices do not rise. If we stick to our assumptions about the relative proportions of the two sectors, of the relative weights of time and piece earnings within Sector A, and of the rates of growth of productivity in each sector, we can then consider the effect of varying *k*. It is not difficult to discover an appropriate figure for this proportion, which will keep the average price level stable. The requirements of the problem are met if wage rates increase by 3⅓ per cent per annum, and total earnings in Sector A by 3⅔ per cent per annum. Average wage costs per unit are then increasing by 3½ per cent, which is equal to the increase in average productivity. An increase of 3⅓ per cent in the timework earnings in Sector A, together with 5 per cent on piecework earnings, gives the required rate of increase of total Sector A earnings of 3⅔ per cent. Since 3⅓ stands in the ratio of $\frac{10}{11}$ to 3⅔, it follows that, in order to maintain price stability, wage rates in each year should rise by ten-elevenths of the average percentage increase in earnings in Sector A in the previous year, i.e., $k=\frac{10}{11}$. This is not a very restrictive condition; and it does not seem beyond the bounds of practical industrial and political statesmanship that a relation of this sort should be established. It should be noted that, under these conditions, average prices in Sector A will be falling by nearly 1⅓ per cent per annum, while average prices in Sector B are rising to the same degree.

One puzzling feature of the examples discussed above is that they do not, in fact, yield an earnings gap as large as that which emerged from our earlier analysis of the historical figures. When productivity in Sector A is increasing by 5 per cent, we should expect it to produce an earnings gap—from the piecework effects alone—of about 1 per cent. But the first variant of our model shows a steadily falling—and ultimately vanishing—earnings gap, while the second variant produces an ultimate equilibrium gap of only ⅓ per cent. The explanation of this is that our model carries back, through the rise of wage rates in Sector A, the effects of the initial earnings rise in that sector. It is, however, quite possible to adapt the model so as to produce the required earnings gap. For this purpose an adjustment must be made to the proportion of time and piece earnings in Sector A. The original assumption—that piece earnings amounted to only 20 per cent of the total in Sector A—was somewhat unrealistic, in face of such facts as are known about conditions in Sector A. In engineering, for example, the proportion of piecework earnings to total earnings of pieceworkers appears to be in the region of one-third; in textiles it is probably much higher.

If we assume that time and piece earnings are equal—in the initial position—in Sector A, then an ultimate equilibrium of wage rates, earnings, and prices will be produced if wage rates rise by 3 per cent per annum, earnings in Sector A by 4 per cent (as a result of 3 per cent in time earnings and 5 per cent in piecework earnings), and overall productivity by 3½ per cent, as before. In this case we have the desired earnings gap of 1 per cent. Prices in Sector A will fall by nearly 1 per cent per annum, and rise in Sector B by a similar amount. In order to maintain the equilibrium, however, wage rates in each year must not rise by more than three-quarters of the percentage rise in Sector A earnings in the previous year.

The Policy Implications of the Model

Are the conditions postulated by this model unrealistic, or over-optimistic? I do not think so. A great deal obviously hinges on the rate of increase of productivity in the two sectors and on the relation between changes in earnings in Sector A and the consequent increases in general wage rates. It should not be impossible to achieve the assumed rates of increase of productivity. Such rates are desirable for other reasons than those considered here. An average rate of 3½ per cent per annum for the whole economy is certainly greater than the average rate achieved in this country in the past ten years, but for much of that time investment has been at a lower level than we have wanted it to be. To maintain this rate of growth year after year would require an annual net investment of perhaps 12—14 per cent of net national income per annum; but this is not beyond our means or, apparently, our willingness to save under present conditions.

On the other crucial question—the relation between general wage rates and earnings in Sector A—there would need to be negotiations with the trade unions. It is the popular view in some quarters—especially amongst those economists who attribute the whole inflationary process to an excess of demand—that no good can come of attempts to co-operate with the trade unions in a national wages policy. Yet, as can be seen in Table II, both wage rates and earnings rose comparatively little in 1949 and 1950, when the trade unions were working with the Government in the interests of price stability. In those years the average standard of living in this country was much lower than it is now, and the pent-up demand from the war years was still pressing upon us. How much more easy it should be to-day to arrive at a working arrangement with the trade unions, provided the Government could show that it had a policy designed to expand production and increase the standard of living all round! To ask for a moderate degree of wage restraint, when real incomes are rising by 3½ per cent per annum, is a very different matter from asking for a wage standstill, when production and real incomes are almost completely stagnant—as they are to-day.

Assuming that agreement on a policy of this sort can be reached, within the framework of an expanding economy, there would still be certain problems of adjustment which would require attention. The last variant of the model implies that average earnings per worker in Sector A would be increasing by 4 per cent per annum, while earnings per worker in Sector B would be increasing by only 3 per cent per annum. After a time this disparity would lead to difficulties, especially if it were required to shift workers from Sector A to Sector B, as is likely to be the case. As a means to overcoming this difficulty it might be possible to secure a consolidation from time to time of part of the rise in piecework earnings in Sector A into the timework part of total earnings in that sector, in place of part of the normal annual increase in wage rates in that sector. There may also be other and better ways of achieving the same object.

Another possible line of approach is to try to reduce the importance of piecework in our industrial system. There are doubtless things to be said both in favour of and against piecework as a means of encouraging efficient work. But little or no attention has been paid to its economic implications. One suggestion which might well be considered, in any event, is that the proportion of piece earnings in the total earnings of pieceworkers in each industry should be kept down to less than half, or even to no more than a third. This, in itself, would strengthen the forces making for price stability.[1]

In addition to the general problem of maintaining a correct relation between average earnings in Sector A and Sector B, we shall continue to be faced by the well-known problem of adjusting differentials between occupations. But this is a problem which will fall into the second rank, provided the major problem of maintaining the momentum of economic progress can be solved. The rational adjustment of differentials would be made much easier if detailed statistics were collected of the number of vacancies and the number of applicants for jobs in each occupational group.

The consideration of the questions raised in this paper has a direct relevance to our current economic problems. At this time—in the summer of 1958—the British economy probably has an excess output capacity of at least 10 per cent in manufacturing, and perhaps 7 or 8 per cent in total. This is the natural result of the policy of holding back output over the past three years, despite the rising wave of investment in industry. We are, therefore, in the very favourable position of now being able to make use of this extra capacity to increase both investment and consumption. Far from suffering from ' excess ' demand, we have too little demand; and potential output is going to waste.

The continued rise in wage rates in this period has been partly the consequence of the price inflation injected into our system in 1950–51 (which has been further extended by the removal of subsidies and the lifting of rent control) and partly the result of a breakdown of confidence between the trade unions and the Government. It is certainly not the result of excess demand, since, as already said, output in this period has risen hardly at all, while output capacity has been growing steadily.

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[1] It is interesting to note that several large firms in this country have recently abandoned piecework on the grounds that it is less efficient than timework for their purpose. This follows a similar trend in the United States. It is a trend which is likely to be further stimulated by automation.

There has, of course, been ' full employment ', but it is noteworthy that in the past three years available manpower has risen much less, on the average, than in previous post-war years. There are some indications that registered unemployment covers only part of the total unemployed—many of whom are married women who do not bother to register at the Labour Exchanges. There is also a good deal of disguised unemployment, since firms which are working below capacity often prefer to keep their full complement of workers rather than run the risk of being unable to re-employ them when demand recovers.

In this situation an expansion of output in the first year by, say, 7 per cent in manufacturing and 3 per cent elsewhere would give an increase in the real national product of about 5 per cent. We could allow wage rates in the first year to rise by 3 per cent, and earnings per worker in manufacturing by 5 per cent, and still keep the rise in wage costs within the rise in productivity (which would be somewhat less than 5 per cent if total manpower employed were increased).

This, it seems to me, is the obvious way to approach our internal economic problem. The real difficulty of such a policy lies, not so much in the complex interrelations of wages, earnings and prices, as in the repercussions of a rising home income on our balance of payments. There need not be, according to this model, any worsening of our competitiveness in world markets in terms of prices, but the inevitable effect of an increase in British home production and real income is that more food and raw materials will be purchased from abroad. The problem is to ensure that the increased imports are matched by increased exports. But that is another story, which cannot be adequately discussed as a footnote to the present article.

THE PROBLEM OF ADEQUATE NUTRITION

By T. Schulz

1. *The Meaning of ' Human Needs ' Nutrition*

With this paper the series of bi-annual surveys of the cost of a ' human needs ' diet, published in the Bulletin, enters its nineteenth year. Most of the earlier articles that set out in some detail the scope and purpose of these surveys, are now out of print. We shall therefore deal first with this general aspect before considering the findings of our most recent survey, in April, 1958.

The first survey in this series, undertaken in the spring of 1940, linked up directly with a similar survey that had been carried out by Mr. Seebohm Rowntree in 1936.[1] The late Mr. Rowntree's intensive studies of working-class incomes and living conditions had suggested to him that there were large numbers of families with incomes insufficient to maintain them in " a state of physical efficiency, while allowing a reasonable margin for contingencies and recreation ", even though their breadwinners were in full employment. Mr. Rowntree therefore endeavoured to ascertain the essential needs of low-paid workers and their families, and in doing so assess the limit below which the wages of an adult male worker should not be allowed to fall. He found that the weekly income of a family with three children should amount to not less than 53s., if the family lived in a town, and to not less than 41s., if the family lived in the country. Of their income he assumed the urban family to devote about 40 per cent to the purchase of food and the rural family about 45 per cent.[2]

Mr. Rowntree computed the cost of a ' human needs ' diet in great detail. In composing his dietary for a family with three children he was "guided by certain menus worked out by teachers of domestic science, which were based on a list of foodstuffs supplied by the Nutrition Committee of the British Medical Association ". He assumed " the greatest possible economy commensurate with national custom " to be exercised by the family until the children began to earn, " when a less stringent dietary can be adopted ". His dietary provided, of all essential nutrients, the amounts considered necessary in 1936, and the quantities which it allowed were sufficient to satisfy the appetites of the average normally active family whose breadwinner was engaged in moderately strenuous work.

The food prices from which Mr. Rowntree derived his figures of total cost were obtained by him towards the end of 1936 from inexpensive shops in working-class districts, in London, York, and High Wycombe. The prices were charged for foods of "reasonable quality"; they were however considerably lower than the contemporary prices employed by the Ministry of Labour for the computation of its cost of living index, as can be seen from the figures in Table I. The lowest price differential in this Table occurs for cheese, for which the price ascertained by Mr. Rowntree fell short by 9 per cent of the price quoted by the Ministry of Labour, while the highest price differential is shown for eggs, for which Mr. Rowntree's price was as much as 58 per cent below the Ministry of Labour price. This does not imply that the prices employed by Mr. Rowntree were unrealistic; his enquiries were carried out with scrupulous care. Neither is it proof that the Ministry of Labour prices were too high. Indeed, these prices were obtained from large numbers of shops for only such foods as normally entered into the diet of working-class families. Thus, the eight Ministry of Labour prices of items of meat—although taking equally account of the prices of English and of imported beef and mutton—allowed as the four expensive cuts only medium-priced roasting meat with bone, while the four cheap cuts were represented by the lowest-priced stewing meats. The cheese referred to in the Ministry of Labour index was imported Cheddar type; bacon was represented by streaky rashers.

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[1] The results of this survey were published by Mr. Rowntree in 1937, in his book, *The Human Needs of Labour*.

[2] The survey of working-class incomes and expenditure undertaken by the Ministry of Labour in 1937–38, showed an average expenditure on food amounting to just under 40 per cent of the total income for the households of urban workers and of nearly 48½ per cent for the households of rural workers.

TABLE I

Index of 1936 ' Human Needs ' Food Prices
Min. of Labour Index Prices = 100

	Rowntree's ' Human Needs ' Prices
Meat, average price	89
Bacon	76
Cheese	91
Eggs	42
Margarine	83
Flour	82
Potatoes	78
Tea	71

Towards the end of 1936, the average weekly earnings of an adult male worker in full employment amounted to between 64s. and 65s. Mr. Rowntree however was concerned with the minimum expenditure on an adequate diet for a family whose breadwinner only had 53s. Since in the various food groups cheaper kinds of reasonable quality were offered and purchased than those listed by the Ministry of Labour, common sense called for the assumption that it would be the housewife catering on an income below the average who also would avail herself of those foods that were priced below the average.

What applied in 1936 still holds good in 1958. Any careful survey of food prices reveals often surprisingly wide price ranges, for foods that sometimes are practically identical or that at least represent nutrionally interchangeable and dietetically acceptable substitutes. Cheap foods can be as nutritious as more expensive ones, and they usually are both clean and fresh; for only the trader with a large regular turnover can afford to carry stocks that sell at prices below the average and on which his profit margin is relatively small. Obviously, certain foods are offered cheaply on occasion because they are easily perishable. Some others are available at disproportionately low prices because they are by-products of more expensive foods and the demand for them is normally limited; examples of this are skimmed condensed milk and certain cuts of stewing meat. If the demand for these foods were suddenly to rise steeply so would inevitably their prices; on the other hand, the demand for the dearer foods which they replace would tend to fall and, consequently, the prices of these foods would fall.

2. *The Cost of Inexpensive Diets*

Our survey in April 1958 was based on the assumption that the housewife setting out to buy a ' human needs ' diet is a careful shopper. The dietary from which we derive our figure of weekly cost—74s. 5d.—provides the same amounts of essential nutrients as Mr. Rowntree's dietary for 1936, except in the case of calcium, the intake of which would be considerably higher from the 1958 diet than from the 1936 diet.[1] The 1958 diet could be bought at a total cost of 74s. 5d. in London, Oxford, Newbury, Reading, Birmingham, High Wycombe, Slough, Banbury, and Abingdon, in main shopping districts frequented by working-class housewives, even though variations in the prices of specific foods were fairly frequent. In certain suburban districts the total cost of the diet was somewhat higher; but families living on the fringes of towns can often grow at least part of the vegetables they require and by thus saving on the outlay on vegetables compensate for additional expenditure resulting from slightly higher local prices, or from fares necessary to bring the housewife to the cheaper district.

The dietary from which our figure of total cost derives is shown in Table II, in the first two columns. Its composition differs from that of our ' human needs' diet for the autumn of 1957 in that the amount of potatoes allowed in the autumn dietary has been reduced and the reduction made good by other foods; in April 1958, potatoes were rather scarce and dear. The substitutes suggested are macaroni, rice, and jam, since in a family with young children an increase in the consumption of cereal foods would probably mean in practice an increase in the consumption of sweet puddings, even though the additional lb. of macaroni might be eaten in the form of savoury dishes. From a dietetic point of view some of the 1½ lb. of jam allowed in the dietary could with advantage be replaced by skimmed condensed milk, which also would slightly reduce the total cost of the diet; but additional jam is likely to have a greater culinary appeal in a family with children than additional milk.

In the autumn of 1957 we computed the total cost of a ' human needs ' diet at 70s. 5½d.; in the spring of 1958 the cost assessed by us was about 5½

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[1] For more details on this point, *cf.*, T. Schulz, A ' *Human Needs* ' *Diet—Autumn* 1957, BULLETIN, Vol. 20, No. 1.

TABLE II

Diets for Families with 3 Children of School Age

	'Human Needs' Diets				Modified Diets with Full Rations			
	Spring 1958		Rowntree 1936		Spring 1948[1]		Spring 1951[1]	
	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
		s. d.		s. d.		s. d.		s. d.
1 Meat	4 ℔	9 4	7 ℔	4 7½	3 ℔ 11 oz.	5 0	2 ℔ 12 oz.	4 2
2 Bacon	1 ℔	2 6	1 ℔ 8 oz.	1 4½	10 oz.	1 3	1 ℔ 4 oz.	2 9¾
3 Eggs	12 eggs	3 6	1 egg	1	4 eggs	1 0	10 eggs	2 11
4 Cheese	2 ℔	3 0	1 ℔	9	7½ oz.	4¾	10 oz.	9
5 Butter & Margarine[2]	2 ℔ 4 oz.	3 4½	1 ℔ 8 oz.	7½	2 ℔ 3 oz.	1 5	2℔ 8 oz.	2 1
6 Other Fats ...	1 ℔	1 0	1 ℔ 4 oz.	7	5 oz.	3¾	10 oz.	7½
7 Sugar...	3 ℔	1 10½	2 ℔	4½	2 ℔ 8 oz.	1 0½	3 ℔ 2 oz.	1 3¾
8 Tea	8 oz.	2 6	8 oz.	9	10 oz.	2 2¼	10 oz.	2 1
9 Bread	19 ℔ 4 oz.	10 6½	23 ℔ 3 oz.	4 0	20 ℔ 2 oz.	4 4	19 ℔ 4 oz.	5 6
10 Flour	3 ℔	1 7	1 ℔ 4 oz.	2	3 ℔	11	3 ℔	1 1
11 Potatoes	10 ℔ 8 oz.	3 9¼	21 ℔	1 3¾	15 ℔	1 10½	21 ℔	3 0
12 Cereals[3]	5 ℔ 4 oz.	4 6¾	3 ℔	9	3 ℔ 10 oz.	2 1¼	3 ℔ 10 oz.	2 6¼
13 Dried Legumes ...	2 ℔[4] 8 oz.	2 3½	2 ℔ 2 oz.	7	2 ℔ 8 oz.	2 2	2 ℔ 8 oz.	2 4
14 Jam, etc.	1 ℔ 8 oz.	1 7½	2 ℔	9	1 ℔ 4 oz.	1 6¾	12 oz.	1 0
15 Skimmed Milk[5] ...	3¾ pt.	1 9	14 pt.	2 0	3¾ pt.	1 4	3¾ pt.	1 6
16 Fresh Milk, bought	16 pt.	11 4	none	—	15 pt.	6 5½	16 pt.	6 8
17 Fresh Vegetables ...	10 ℔ 8 oz.	5 0	10 ℔ 8 oz.	9	11 ℔	3 1½	11 ℔	3 2½
18 Sausages	none	—	1 ℔	6	1 ℔	1 1	8 oz.	9½
19 Fish	1 ℔ 8 oz.	1 9	2℔ 8 oz.	9¼	2 ℔ 12 oz.	1 10	6 ℔	6 0
20 Other	—	3 1½	—	1 2	—	2 3¼	—	2 3¾
21 School Milk ...	5 pt.	free	none	—	5 pt.	free	5 pt.	free
Cost of Weekly Diet...		74 5		21 11		41 8		52 8

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[1] All foods shown above the double line were rationed.

[2] In this Table, only margarine. In the corresponding Table A (*Appendix*), only butter.

[3] Rolled oats or oatmeal, rice, semolina, macaroni, etc.

[4] Peas, beans, lentils.

[5] Condensed; quantities given in terms of fresh milk.

per cent higher, partly in consequence of seasonal rises in the prices of vegetables and milk. The price of milk was however due to be reduced by a ½d. a pint from May 1st, and the prices of vegetables showed a declining trend.

It is instructive to compare the quantities of foods in the 1958 ' human needs ' dietary with the quantities shown in the three dietaries in the adjoining columns of Table II. Mr. Rowntree's 1936 dietary allowed the family more meat and less milk; rationing in 1948 and 1951 allowed not only less meat but also less cheese, fewer eggs and—in 1948, for a family with three children of school age—even less milk and fewer carbohydrate foods, than our 1958 dietary. The dietaries for 1948 and 1951 in Table II assume the purchase of all the rations that could be obtained by a family with three children[1]; only butter is replaced by margarine. The rationed foods are listed in these dietaries in the upper section, above the double dividing lines. Unrationed meat foods were scarce in 1948 and 1951, and although the meat content of sausages was very low, few housewives were able to purchase on the average more than the weekly quantities shown in Table II, *viz.*, 1 lb. in 1948 and ½ lb. in 1951.

3. *Food Prices and Nutritional Values*

In assembling the data for our ' human needs ' dietary we disregarded all low prices of a kind that might be termed ' windfalls '—*viz.*, prices that *in the shops in which they obtained at a given moment* would normally be higher. Such temporary price reductions were, however, encountered not infrequently. The dietary on which our figure of cost in the spring of 1958 is based is, indeed, not strictly the most economical one that could be devised; neither is it the most varied dietary that could be evolved for a total outlay of 74s. 5d. It is merely a possible inexpensive dietary composed of foods that were available to housewives in all the districts covered by our survey; it provides the ingredients for nutritionally adequate meals of a general type to which most people are accustomed. That individual housewives might have been able to improve upon it in accordance with variations in local supplies and prices of foods, is indicated by the actual low-cost diets of two families in March 1958, which we publish in the Appendix.

Table III sets out some of the bargains encountered by us in different districts. All the foods listed in Table III were carefully inspected and when necessary, tested by cooking, so as to make sure that they were indeed of a " reasonable quality ". No one housewife could have bought all of them at these low prices. Every housewife could however have obtained meat at an average price of less than 2s. 4d., in which case more meat than the 4 lbs. allowed in our dietary could have been purchased for the same total outlay on meat. With this modification in the type and quantity of meat the dietary for the spring of 1958 would have approached more closely the meat allowance in Mr. Rowntree's 1936 dietary. Mr. Rowntree suggested that in a ' human needs ' diet the traditional solid Sunday joint should be replaced by stuffed breast of mutton.

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[1] Children under 5 years of age were entitled to only half a meat ration, worth 6d. a week in 1948 and 5d. in 1951. In compensation they obtained 1 pint of milk per day for 1½d.

The prices set out in Table III indicate that the 1958 ' human needs ' diet outlined in Table II *might* have been purchased for less than 74s. 5d. The indices of nutritional values per unit expenditure in Table IV show that dietetically adequate nutrition *could* have been devised at a lower total cost. In this Table, the nutritional values of different foods are compared with the corresponding values for bread, outlay for outlay, at the prices employed for computing the cost of a ' human needs ' diet in April 1958. Fresh vegetables other than potatoes have been omitted from Table IV, since for the nutrients there listed their indices would be very low. Nevertheless, fresh vegetables are indispensable; for they are the most important sources of vitamins A and C in an average low cost diet. Old potatoes, however, have by the end of March lost most of their earlier vitamin content and as regards vitamin values, could easily be replaced by relatively small additions to the diet of swedes and greens. The nutritional value of old potatoes in spring derives essentially from their carbohydrate content. It may come as a surprise that in that capacity potatoes at 4½d. a lb. were a dearer food than bacon at 2s. 6d. a pound—even though the feeling of satiety produced by, say, one shilling's worth of potatoes might be considerably greater than that produced by one shilling's worth of bacon. Cheaper and dietetically acceptable substitutes for potatoes would be dumplings made of fat and flour, rice, macaroni, and bread.

Looking at the indices of the main animal protein foods it will be observed that in terms of a given outlay, the animal protein of bacon was well over five times as dear as the animal protein of cheese and three times as dear as the animal protein of condensed skimmed milk. The relatively high calorific value of condensed skimmed milk, as compared with that of full cream fresh milk, reflects the large sugar content of the condensed milk.

Vegetable protein could be obtained at the lowest cost from dried legumes and, next to these, from flour. Flour was also the cheapest calorific food, but sugar and margarine, too, provided calories at a lower cost even than the cost of calories from bread.

Table V gives the standard calorific and protein requirements of families of the structure assumed for our ' human needs ' dietary, *i.e.*, families with three children of school age. In addition, we also show the standard requirements of two families with, respectively, three and two children—in each family one child under school age—whose actual average food consumption and expenditure is set out in the Appendix. The calorific and protein intake from the various diets is represented in Table V in the form of indices related to the figures of standard requirements, which in each instance have been equated with 100. The figures of animal protein provided by the different diets are expressed in Table V as percentages of the total standard protein requirements. For comparison with these figures of requirements and intake the corresponding data obtained from the Ministry of Labour survey figures

TABLE III

Prices of Inexpensive Foods, April, 1958

		Lowest Prices		' Human Needs ' Diet	
		s.	d.	s.	d.
Imported Roasting Meat, Beef	lb ...	1	10	2	4
do. Mutton	lb ...	2	2		
Imported Stewing Meat, Beef	lb ...		8		
do. Breast of Lamb	lb ...		6		
Pig's Head	lb ...		6		
Bacon, Fat Pieces	lb ...		8	2	6
do. Streaky	lb ...	1	8		
Margarine	lb ...	1	3	1	6
Cheese	lb ...	1	4[1]	1	6
Beef Fat	lb ...		8	1	0
Tea	lb ...	3	0	5	0
Rice	lb ...		8		10
Semolina	lb ...		9		10
Oatmeal	lb ...		8½		10
Macaroni	lb ...		10½	1	0
Dried Peas and Beans	lb ...		9		11
Jam (Plum)	lb ...		9	1	1
Herrings	lb ...	1	1	1	2
Swedes	lb ...		2½		4½
Turnips	lb ...		3		4½
Onions	lb ...		6		8
Spring Greens	lb ...		6		8

[1] Rindless processed cheese.

TABLE IV

Indices of Nutritional Values per Unit Expenditure at Prices in April 1958[1]

	Price[2]		Calories	Protein	Calcium	Iron
	s.	d.	per Unit Expenditure			
Bread		11½	100	100	100	100
Main Animal Protein Foods:						
Cheese	1	6	60	108	278	14
Cond. Skimmed Milk ...		10½	57	61	171	9
Herrings	1	2	20	59	28	28
Meat	2	4	22	41	2	42
Milk, Full Cream		8½	23	36	110	5
Eggs		3½	11	27	10	27
Bacon	2	6	40	20	2	14
Main Calorific Foods:						
Flour	1	7	145	143	142	145
Sugar...		7½	133	—	—	—
Margarine	1	6	112	—	1	7
Oatmeal		10	103	93	35	157
Rice		10	92	49	2	13
Semolina		10	89	82	11	39
Macaroni	1	0	74	69	13	44
Dried Legumes[3]		11	66	164	52	215
Potatoes		4½	34	23	9	30

[1] The prices employed for compiling the indices are those used for the figures of cost in the ' human needs ' dietary for the spring of 1958, in Table II.

[2] The prices refer, in the case of eggs, to one egg; in that of condensed milk, to a tin; in that of full cream milk, to a pint; in that of bread, to a loaf weighing 1¾ lb; in that of flour, to a bag of 3 lb. In all other instances the price is given per 1 lb.

[3] The nutritional values taken are the average values for peas, beans, and lentils.

of average consumption of urban working-class households in 1937–38, are tabulated in the first line of the Table.

It will be noticed that the diet allowing for the purchase of the full rations by a family with three children of school age in 1948 as well as the actual diet eaten by the family with three children—one below school age—in March 1958, provided less than the standard calorific requirements computed for these families. This fact must however be interpreted very differently in the two cases. The 1948 dietary represents an average diet the calorific content of which was fixed within narrow limits through the rationing of all the main carbohydrate foods.[1] This diet is highly unsatisfactory because the nutritional content of any average diet is satisfactory only if it satisfies the accepted nutritional standards. Nevertheless, individual nutritional requirements vary widely, even for persons of the same age, height, weight, and engaged in the same kind of work. Some people need more than the standard requirements; others need less. Wide individual variations, especially in the calorific intake, are perfectly normal. Actual intake of nutrients below the computed standards suggests malnutrition only if a diet is generally badly balanced or if the low nutritional intake appears as the concomitant of an abnormally low food expenditure. Neither qualification obtains for the family with three children that supplied to us their actual dietary for March 1958. The food expenditure of this family was slightly above the standardized cost of a ‘ human needs ’ diet in the first three weeks of March 1958, and the protein content of their diet—in particular as regards the more expensive proteins, derived from animal foods—was high. Additional calories, if required, could have been bought very cheaply, or even without additional cost by curtailing slightly the purchases of animal protein foods.

It is interesting to see that the two actual family diets in 1958 contained higher percentages of animal protein not only than the ‘ human needs ’ diet but also than the average diet eaten in 1937–38 by urban working-class families. In the case of the family with three children, much of the protein was provided by meat; in the case of the family with two children, it derived largely from milk, of which each child had more than a pint daily and each adult half a pint. This family consumed little meat and no fish. Of their calorific intake nearly a quarter was provided by sugar, of which the family consumed a lb. a day, in cocoa, coffee, cake, stewed fruit, and sweet puddings. The diet of this family—although somewhat unusual—was nevertheless remarkably well balanced; its composition suggested that the housewife was both a very efficient cook and a very careful shopper. She obviously bought what suited best the taste of her family and was capable of combining her ingredients in such a way as to obviate the danger of nutritional deficiencies, a feat that is not easy in the case of so large a consumption of sugar.

[1] Additional calories could however have been obtained by exchanging for the point-rationed skimmed milk point-rationed cereal foods; but this would have reduced further the possible intake from the diet of animal protein.

TABLE V

Nutritional Values and Cost of Diets

	Standard Weekly Requirements		Intake from Diet Standard Requirements=100		Animal Protein as % of Standard Total Protein Requirement	Weekly Average Income[2]	Cost of Diet as % of Income
	Calories	Protein	Calories	Proteins			
		gm.	%	%	%	s. d.	%
1937–38 Urban Diet (3.8 Persons)[1]...	68,000	1,800	100	100	48	86 3	39½
'Human Needs,' Spring 1958 (3 Children)... ...	82,500	2,300	100	115	49	268 0[3]	28
do. Rowntree 1936 (3 Children)	82,500	2,300	100	115	49	64 6[4]	34[4]
Modified Diet, Spring 1948 (3 Children)	82,500	2,300	90	115	43	144 0	29
do. Spring 1951 (3 Children)	82,500	2,300	100	115	49	170 2	31
Actual Family Diet, March 1958 (3 Children) ...	71,500	2,000	80	120	64	—	—
do. (2 Children)	56,500	1,550	100	100	54	—	—

[1] Ministry of Labour survey of 8,905 urban working-class households, containing on the average 1 child and 0.3 juveniles.

[2] For 1937–38 survey, actual income. Rowntree 1936, average weekly industrial earnings of male adults. Spring 1948, spring 1951, and spring 1958, average weekly industrial earnings of male adults plus family allowances.

[3] Approximately.

[4] Mr. Rowntree however related his diet to an income of only 53s., in which case the cost of the diet absorbed between 39% and 41%.

4. *‘Human Needs’ and ‘Average’ Food Consumption*

The two actual family dietaries, which we obtained in March 1958, show the food expenditure of households whose nutrition cost but little more than that provided by a ‘human needs’ diet. The composition of both these dietaries was superior to that of a standard ‘human needs’ dietary mainly because both housewives were remarkably skilful in adapting their menus so as to profit from the local variations in food supplies and prices. Dietaries of individual families, interesting though they are, can however illustrate merely the achievement of individual housewives; as proofs such dietaries are valid only in relation to each particular family to which they apply. They cannot set a ‘human needs’ dietary into a proper perspective, because they can provide no answer to the question: How, in fact, does a ‘human needs’ diet compare with an ‘average’ working-class diet?

This perspective can now be established, thanks to the Ministry of Labour *Survey of Household Expenditure in* 1953–54, the results of which have recently been published. In Table VI are set out the figures of weekly food expenditure obtained by the Ministry of Labour for families consisting of husband, wife, and three dependent children, having a total household expenditure of, respectively, 199s. 11d., 232s. 2d., and 301s. 8d.[1] In October 1953, the average weekly earnings of an adult male industrial worker amounted to 189s. 2d. and the family allowances for families with three dependent children to 16s. Thus a family with three children spending £10 per week disposed presumably of about an average working-class income, while a family that could spend over £11 12s. was already placed well above the average. Side by side with the figures of average food expenditure by these three types of families are given in Table VI the figures of cost of food computed for the ‘human needs’ dietary for the autumn of 1953, which was published in the BULLETIN.[2] It will be noticed that the total outlay on the 12 main items of diet is almost identical for families with a total household expenditure of about £10 per week and for the hypothetical ‘human needs’ family of the same structure. The ‘human needs’ diet however provides only what is essential; in the ‘average’ diet these basic foods are supplemented by cake and biscuits, chocolate, sweets, ice cream, etc. The nutrients obtained from these additional items—all predominantly carbo-hydrate

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[1] The numbers of households from which these averages were obtained, are given at the head of the columns in Table VI. They may appear relatively small; yet they represent the total numbers of families of this structure and within the income range of from £8 to £20 per week in a sample of nearly 13,000 households. Of these 13,000 households, less than one-third consisted of two adults and one or more dependent children, *viz.*,

	No.	%
households with one child	1,665	42
do. two children	1,447	36
do. three children	571	14½
do. four children	181	4½
do. five and more children ...	115	3
all households of two adults and dependent children	3,979	100

[2] Vol. 15, No. 12.

TABLE VI

Weekly Expenditure: Husband, Wife and 3 Children

	Ministry of Labour Enquiry 1953—1954			' Human Needs ' Dietary Autumn 1953
Nos. of Households in Sample	*115*	*209*	*144*	—
	s. d.	s. d.	s. d.	s. d.
Total Household Expenditure	301 8	232 9	199 11	—
Expenditure on Food:				
1 All Meat and Fish	24 4¾	21 9¼	19 4¾	16 4
2 Cheese	1 7	1 5	1 4	1 1
3 All Milk	10 8¾	7 11½	7 11	9 9
4 Eggs	5 7	5 2	4 10½	1 10½
5 All Fats	5 10[1]	6 3[2]	5 9½[3]	5 0
6 Sugar	2 5½	2 7	2 3½	2 2¼
7 Bread	5 7½	5 11½	5 11¾	7 1
8 Flour	11¾	1 1½	1 1¼	1 6
9 Cereals[4]	1 11¾	1 11¾	1 11	3 6
10 Potatoes	3 4½	3 5¾	3 4	3 0¾
11 All other Vegetables[5] ...	5 1½	4 10¼	4 4	6 3½
12 Tea	2 10¾	2 11½	2 7½	2 0
Total 1—12	70 6¾	65 6	60 10¾	59 8
13 Cakes and Biscuits	5 11¾	5 9¾	5 6	—
14 Chocolate, Sweets, Ice Cream	6 6¼	4 11¾	4 8	—
15 Soft Drinks	1 1¾	11½	10½	—
16 Other Foods *excl. meals out*...	11 8[6]	8 11[7]	7 11¾[8]	5 7[9]
17 Meals Out	9 11	5 4	4 4¼	—
Grand Total	105 9½	91 6	84 3¼	65 3

[1] Including 3s. 0¾d. spent on butter.
[2] Including 3s. 3d. spent on butter.
[3] Including 3s. 0¼d. spent on butter.
[4] Rolled oats and oatmeal, rice, macaroni, semolina, ready-to-eat cereals, etc.
[5] Fresh, tinned, and dried (including dried legumes).
[6] Including 5s. 0½d. spent on fruit (fresh, tinned, and dried).
[7] Including 4s. 1d. spent on fruit (fresh, tinned, and dried).
[8] Including 3s. 6¾d. spent on fruit (fresh, tinned, and dried).
[9] A special allowance—unspecified—of 2s. 3d. was included in this figure in consideration of difficulties in shopping resulting from the transition from rationing to derationing. An outlay of 8d. was suggested on cooking apples.

foods—are supplied in the ' human needs ' diet by the larger allowances of bread, flour, and household cereals. Vegetables can provide cheaply all the essential vitamins and minerals which in more expensive diets are obtained partly from fruit; fruit is included in the ' human needs ' dietaries only for culinary reasons. Milk, on the other hand, plays a more important role in our ' human needs ' schedules than in the actual average dietaries, except in the dietary of the families with a weekly household expenditure in 1953–54 of over £15. Nevertheless, the milk consumption suggested in our ' human needs ' dietary is no more than adequate for a family with three growing children, for whom milk is an important source of various nutrients and, in particular, of bone-building calcium.

An average outlay on food of 65s. 3d. would have taken up less than 32 per cent of the weekly average income in 1953–54 of working-class families with three dependent children. The actual average food expenditure of 84s. 3¼d., ascertained by the Ministry of Labour, represents 41 per cent of this average income. This is about the proportion that Mr. Rowntree assumed to be spent on food in 1936 by an urban family living on a ' human needs ' income. It is also the proportion that immediately before the last war was in fact spent on food by urban working-class families. The cost of our ' human needs ' diet for the spring of 1958 would have absorbed only 28 per cent of the average weekly income of an industrial worker with three children; an outlay of 40 per cent would have amounted to round £5. Any individual family will obviously adjust the proportion of their income devoted to the purchase of food in accordance with their particular needs and habits. A ' human needs ' diet is a nutritionally adequate but, as Mr. Rowntree pointed out, a "stringent" diet. With better incomes, more varied diets can be obtained. There is no reason why any family should pare down their food expenditure below the level which they can afford and which provides them with the meals that they enjoy.

Appendix

Two families, one from the north of England and the other living near London, were sufficiently interested in the problem of a ' human needs ' nutrition to suggest certain possible dietary improvements and, in confirmation of their feasibility, submitted to us their own dietaries for several weeks in March 1958. Both families had listed carefully their food expenditure and consumption. One of the families had two children and the other three. In each family, one child was below school age; the other children attended school. No main meals were obtained away from home by any member of these families. The diets of both families were inexpensive, although a little above the —standardized—' human needs ' cost in the first half of March 1958. Their interesting nutritional aspect has already been considered in Part 3 of this article, where figures of nutritional intake from these diets are given in Table V.

The average weekly diets purchased by the two housewives are set out below in Table A. In order to facilitate comparisons between these diets and the diet schedules in Table II of this paper, the lists of foods in both Tables are drawn up in identical sequence. Hence, dried legumes and skimmed condensed milk—items 13 and 15—are mentioned also in Table A, even though neither family bought these foods.

It will be seen that the family with three children paid for their meat per lb. almost exactly the same as is allowed in our ' human needs ' dietary for the spring of 1958. The family with two children only bought per week a 2-lb. joint and, in addition, 8 oz. of cooked meat for the husband's sandwiches.[1] Their weekly joint of meat cost on the average 2s. 10d. a lb. The low average price for eggs recorded by this family stems from the fact that cracked eggs were bought occasionally. Both families bought self-raising flour at 8d. a lb., while our ' human needs ' dietary assumes the purchase of plain flour, at 1s. 7d. for a bag of 3 lbs. The family with two children consumed very large quantities of sugar—on the average 1 lb. per day—and also large quantities of fruit, *viz.*, 5 lbs. of fresh fruit per week and 2s. 9d. worth of tinned fruit. This family as well as the family with two children paid on the average only one shilling for a lb. of bananas, apples, oranges, and tomatoes, while the average market price in March of all these foods was considerably higher.

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[1] The husband informed us that he did not like the meals provided by the works' canteen, but that his wife was a first class cook.

TABLE A

Actual Family Diets in March, 1958

	Family with 3 Children		Family with 2 Children	
	Quantity	Cost	Quantity	Cost
		s. d.		s. d.
1 Meat	6 ℔ 8 oz.[1]	15 5[1]	2 ℔ 8 oz.[2]	8 5[2]
2 Bacon	1 ℔ 8 oz.	4 10	1 ℔	3 0
3 Eggs	28 eggs	8 2	12 eggs	2 10
4 Cheese	8 oz.	1 0	1 ℔ 8 oz.	2 6
5 Butter and Margarine	1 ℔ 8 oz.[3]	3 7½	8 oz.[3]	1 7
6 Other Fats	1 ℔	1 3	1 ℔	1 6
7 Sugar	3 ℔	1 6	7 ℔	4 1
8 Tea	8 oz.	3 0	4 oz.	1 3
9 Bread	10 ℔ 8 oz.	5 6	7 ℔	3 6½
10 Flour	3 ℔	2 0	3 ℔	2 0
11 Potatoes	7 ℔	2 0	10 ℔	3 0
12 Cereals	none	—	12 oz.	9
13 Dried Legumes	none	—	none	—
14 Jam, etc.	1 ℔ 8 oz.	1 6	8 oz.	1 0
15 Skimmed Milk	none	—	none	—
16 Fresh Milk, bought	21 pt.	11 8[4]	21 pt.	12 6½[4]
17 Fresh Vegetables	7 ℔ 8 oz.	3 10½	5℔	3 0
18 Sausages	8 oz.	1 0	none	—
19 Fish	2 ℔	3 0	none	—
20 Other Foods, bought	—	1 9	—	20 6[5]
21 School Milk	3½ pt.	free	1½ pt.	free
Cost of Weekly Diet		71 1		71 6

[1] Including 2½ ℔ of roasting meat costing 8s.

[2] Including ½ ℔ of sliced cooked meat costing 2s. 9d.

[3] Butter only.

[4] Total cost of 21 pints minus 2s. 4d. allowed for a child under 5 years old.

[5] Including 2s. 11d. for coffee, 2s. 3d. for cocoa, 3s. for tinned beans and peas, 2s. 9d. for tinned fruit, 5s. for 5 ℔ of apples, bananas, oranges, and tomatoes, and 2s. 10d. for 1½ ℔ of biscuits.